Farm Chemicals

Pioneer Journal of the Industry

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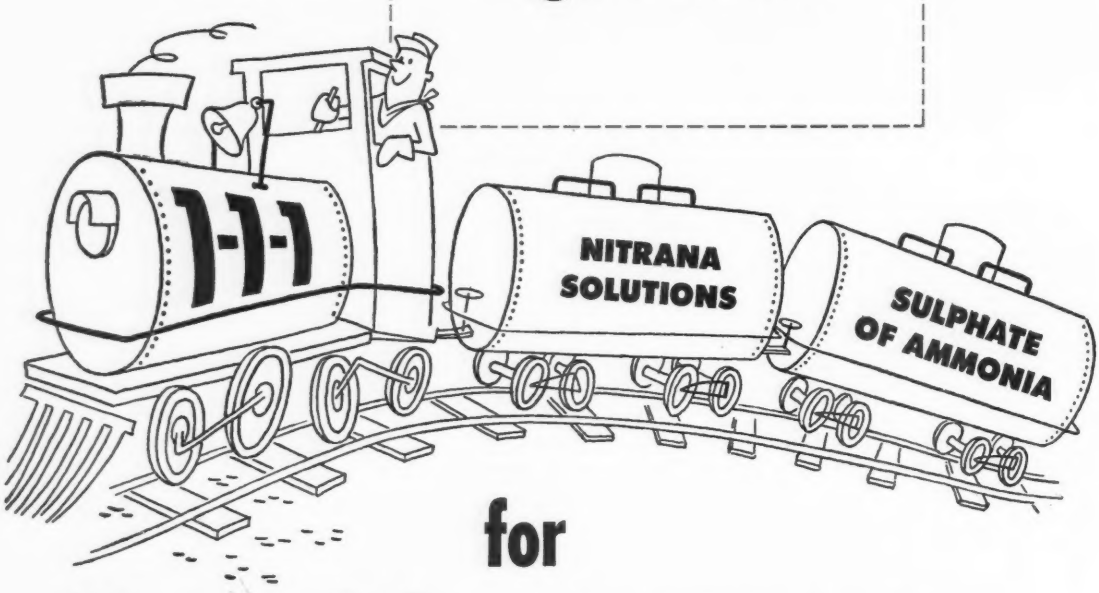

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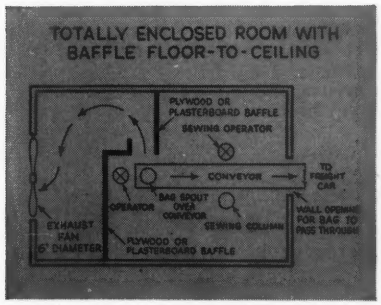

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Farm Chemicals

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Cover Story

Cotton pests are already at work in some locations. Survival counts of bollworms are included in this issue's Pest Report; at scattered locations in Texas, the bollworm is reported feeding in terminal buds and on green pods; and, also in Texas, fleahoppers have been reported throughout the Lower Rio Grande valley.

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In this issue . . .

Contrary to Appearances, this was not planned as a safety issue; there were just too many good items on safety to pass up. On page 42 Snyder Chemical's Harold Krueger presents a good case for small plant safety programs showing that they can and do pay off.

The 1954 Fertilizer section, NSC, safety contest is reviewed on pages 44-45, and we hope that you will note mention of this year's drive. We urge all plant food producers, large and small, to support the section in its work by joining the National Safety Council and through participation in the 1955 contest. The coupon on page 45 will bring you more information.

Use of Cellu-San in the preservation of harvesting containers is the subject of a paper by Milton Goll and Chester Thompson beginning on page 26. They show the advantages of protection from fungus and moisture and report on various test findings.

Want to try an employee tractor driving contest? On page 30 we describe such an event as planned by Kingsbury & co. for its Indianapolis plant and include a diagram prepared by Superintendent M. H. Talbott.

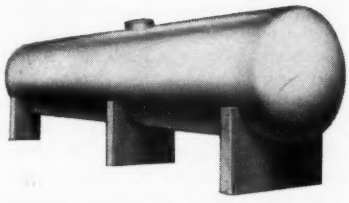
Archer Smith's plan for utilizing fuel oil trucks in liquid fertilizer distribution has already received considerable attention. This year, as explained on pages 32-33, the scheme is being expanded to include application of insecticides and weed-killers.

J. G. Watts has summarized the effects of insecticides on phytotoxicity and off-flavor in a paper which begins on page 47. Included are special references to important present-day materials.

Pesticide papers delivered at the Cincinnati meetings of the American Chemical Society are briefly reviewed on page 39 and on page 37 there is a short feature on the use of Karmex-DL for pre-emergence weed control in cotton.

22,000-gallon non-pressure bolted tank for bulk storage.

BUTLER offers 3 ways to profit from liquid nitrogen bonanza



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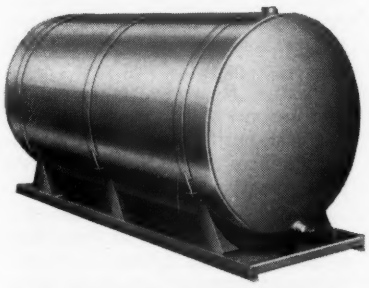

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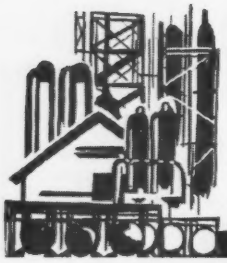

INDUSTRY NEWS

TVA to Make Diammonium Phosphate

TVA will produce diammonium phosphate in face of some opposition; Muscle Shoals plant has been modified for eventual output of 40,000 tons.

TVA is going ahead with production of diammonium phosphate, despite opposition from some of the fertilizer industry and a number of congressmen. The 21–53–0 material will be produced through modifications of existing facilities at the Muscle Shoals, Ala., plant with production for 1955 set at less than 5,000 tons.

In 1956, it is expected that about 20,000 tons will be turned out, and 40,000 ton output is possible. The agency hopes that the national market will reach several hundred thousand tons yearly and, with establishment of such a market, TVA would plan to retire from production. Present commercial output is around 40,000 tons.

Estimates of production costs at favorable locations indicate the commercial producers with an economical source of ammonia and phosphoric acid could sell the material at about $120 a ton f.o.b. with a margin for profit. TVA's price to wholesale purchasers is set at $110.49, bagged f.o.b. Sheffield, Ala., a price claimed to be well above cost of production.

TVA pointed out that by-product ammonium sulfate producers could follow the lead of Colorado Fuel & Iron in converting their facilities to diammonium phosphate manufacture.

The material will be sold under a program following the procedure used in introducing concentrated superphosphate and ammonium nitrate. It will be used on test-demonstration farms in an intensive educational program under supervision of extension services in about 20 states.

In the educational sales program worked out with land-grant colleges, distributors and USDA agencies, wholesalers will aid local dealers and farmers in proper use and handling of the diammonium phosphate.

Potential costs of commercial material, stated TVA, appear to favor immediate use for direct application in about half of the 35 states in which the agency has educational sales programs. Some will go into high analysis mixtures and, where potash is required, the outlook for its use in these mixed goods and in blending and bulk spreading operations is termed favorable.

Some mateial may be used by dry mixers to upgrade materials presently manufactured thus lowering the cost of plant nutrients. This use will be permitted only if the end product contains a minimum of 40 per cent plant food content.

High cost per ton may prove a deterrent to farmer acceptance, TVA pointed out, and the economics of production and distribution "are such that considerable work will be needed to determine the geographic areas and the agronomic uses" where it will be advantageous to the farmer.

NFA Reports Slow Southern Fert. Sales

This season's fertilizer sales in Southern US are about 5 per cent behind last year, although Calif.-Ariz. area shows increase, according to NFA spot survey in March.

Results of a spot survey conducted in March by the National Fertilizer Association show that fertilizer sales so far this season in the Southern United States are running about 5 per cent behind sales during the corresponding period last year.

There are indications, however, that by the end of the season, the situation will improve, with sales for the entire year within 2 to 3 per cent of 1953-54. On a plant food basis, area consumption is expected to equal or slightly exceed that of 1953-54.

NFA reports that the area represented by the survey includes Virginia, North and South Carolina, Georgia, Florida, Kentucky, Tennessee, Mississippi, Alabama, Arkansas, Louisana, Oklahoma, Texas, California, Arizona and New Mexico.

An increase in sales to date was indicated only in the California-Arizona area and net increase for the year is predicted at about 7 per cent.

In the area of Arkansas, Oklahoma and Texas, sales seem to be on a par with last year's, with predictions of a 10 per cent increase for the whole year.

Although the southeastern states as a group showed the largest sales decrease, improvement is expected by the season's end. Reports from Florida showed shipments about equal to those for the corresponding period last year.

In the Kentucky-Tennessee area, sales are only about 3-5 per cent behind last year, but there are indications that the gap may be widened as the season progresses.

The association reports that of all states covered by the survey, sales in Louisiana seemed furtherest behind at this point, apparently because of adverse weather conditions, but most observers believe that consumption will at least break even with that of 1953-54 by the end of the season.

NFA plans a spot survey of the country around June 1.

Over 800 to Attend First NPFI Convention

Presidents Russell Coleman of the National Fertilizer Association and Paul T. Truitt of the American Plant Food Council estimate that over 800 persons will attend the National Plant Food Institute preliminary convention at the Greenbrier, White Sulphur Springs, W. Va., June 12-15.

Featured on the program will be a forum on problems relating to fertilizer-pesticide mixtures with M. V. Bailey, American Cyanamid co., as moderator. Speakers will include E. L. Peterson, assistant secretary of USDA, Senator John L. McClellan and Rep. H. D. Cooley. A youth panel with representatives of FFA, 4-H and NJVGA groups will also appear on the program.

Tolerances Established

SES (2,4-dichlorophenoxyethyl-sulfate) manufactured by Union Carbide and Carbon corp. Six ppm of SES residues will be permitted in or on potatoes, peanuts, peanut hulls and peanut hay; and 2 ppm will be permitted in or on asparagus and strawberries.

Work Underway on Escambia Bay Plant

Chemico is erecting the Escambia Bay Chem. corp. nitrogen plant at Pensacola, Fla. Ashcraft-Wilkinson has been named exclusive sales agent.

Construction of the $30 million nitrogen plant of Escambia Bay Chemical corp. at Pensacola, Fla., is already underway, according to an announcement by M. A. Abernathy, president of the chemical firm and vice president of United Gas corp., which together with Electric Bond and Share corp. and National Research corp. owns the new petrochemical company. Chemical Construction corp. is erecting the facilities.

Ammonium nitrate, anhydrous ammonia, nitric acid, nitrogen solutions and other by-products will be manufactured for industrial and agricultural use. Sales of the plant's production, which is expected to start early in 1956, will be handled exclusively by Ashcraft-Wilkinson co.

Board chairman of Ashcraft-Wilkinson, G. W. McCarty, said, "We are pleased to be associated with Escambia Bay Chemical corp. This tremendous new plant—the only one of its kind in this section of the South—will fill an important need by Southern industry and agriculture for these vital chemical products."

Escambia Bay Chemical originally was named Gulf Chemical co., but the change was made after consultation with Gulf Oil corp. because of the similarity.

Chemical, Allied Products Employment Drops 3%

Employment in the chemical and allied products industry in 1954 approximated 785,000, a drop of about 3 per cent from the peak 1953 level of almost 806,000, according to the U S Department of Commerce Chemical and Rubber Industry Report.

A breakdown shows a greater number of employees in the fertilizer segment of the industry in 1954, 37,500, than in 1953, 37,200. Of these, 29,100 were engaged in production work in 1954 and 29,000 in 1953.

Extended Heptachlor Tolerance Requested

Velsicol corp. is reported to have applied to the Food and Drug Administration for extension of the tolerance of 0.1 ppm for heptachlor on potatoes to include alfalfa, clover and sweet clover, beets (including sugar beets), cabbage, brussels sprouts, kohlrabi, cauliflower, corn, cotton, pasture and range grass, onions, peanuts, peas, sugarcane, sweetpotatoes and turnips.

Tailings

Mosquito control officials at the New Jersey AES report discovery of a colony of house mosquitoes in a flooded Hoboken cellar where DDT had been used for the past five years. The strain is 15 times as resistant to DDT as ordinary mosquitoes.

On the other hand, lab work by Paul Dahm, Iowa State College, showed that some DDT-resistant flies lost their resistance in about eight months after being unexposed to the insecticide. This points up the possibility that resistance might be countered with field applications rotating various insecticides.

♦ ♦ ♦ ♦

FTC has moved to speed up results of its studies on mergers through appointment of a task force of commission personnel. Principal duties will be to review corporate mergers with greatest significance and to develop means of speeding the investigation.

♦ ♦ ♦ ♦

More trouble between phosphate producers and Florida growers reported—this time a case involving US Phosphoric Products. Judgements totaling almost $1.5 million are asked in civil suits by 22 firms and farmers who cite alleged damage to crops, mainly gladiolus and tomatoes. Damage, say growers, resulted from stack gases. US Phosphoric has filed a motion to dismiss the suits.

♦ ♦ ♦ ♦

Could this idea help your dealer relations? Wyandotte Chemical is offering its calcium chloride distributors prizes for "the most successful way to use company literature in the promotion of sales." This could be used in a variety of ways to help maintain dealer interest and drive.

♦ ♦ ♦ ♦

Wyoming AES tests show that a 1½ per cent dieldrin dust is the best material used so far for control of sheep ticks. The material stays in the wool long enough to kill young ticks as they hatch, it acts as a specific for the pests and one dusting after shearing rids a band of all ticks. Tests have FDA approval.

♦ ♦ ♦ ♦

Kaiser steel is said to have tested diammonium phosphate production at its Fontana, Cal., coke oven works. Interest in the product is demonstrated by several firms considering the TVA wet process acid method.

♦ ♦ ♦ ♦

An important potato pest was intercepted recently at Nogales, Ariz., when living larvae of the picudo de la papa (potato weevil) were found in Mexican potatoes. Although not known to occur in the US, it is a serious insect in parts of Mexico.

Wheat Rust Protection With Sulfur, Carbamates

Tests show seed or breeding wheat can be protected against wheat rust with sulfur dust and zinc or manganese carbamate fungicides.

It now is possible to protect small plots of seed or breeding wheat against wheat rust with chemicals, according to results of studies carried out by W. C. Haskett, USDA plant pathologist at Kansas State College, Manhattan.

"Tests have shown that wheat is best protected from rust by several timed applications of sulfur dust and zinc or manganese carbamate fungicides," Haskett stated.

Although similar protection could be given to large fields by means of airplane spraying, Haskett said the rate and number of applications required to give control would not be economically practical in Kansas.

Calcium sulfamite, the commercial weed killer, also is effective in controlling wheat rust, but is not recommended because it produces severe burning of plants, shriveled grain, poor germination and injures the milling and baking qualities of the grain, Kansas State reports.

Further testing of new chemicals now is in progress.

New Georgia Rules For Fert-Pest Mixes

Ga. Agriculture Commissioner Campbell announces rules for specialty and field crop fertilizers with pesticides, labeling, registration.

New rules and regulations governing fertilizers and pesticides have been announced by Phil Campbell, Georgia commissioner of agriculture.

Specialty fertilizers with pesticides may contain organic pesticides except systems and may be sold without restriction as to area or package size, for horticultural and ornamental uses.

Field crop fertilizers with pesticides may contain organic pesticides known not to affect flavor and incapable of translocation so as to transmit residues. They may be sold without area or package size restriction, but there can be no bulk sales or deliveries.

All packages must be labeled for both fertilizer and pesticide guarantees with labels acceptable under state and Federal pesticide acts. Dual registration under Georgia fertilizer and economic poisons acts is required.

Safety Award to Davison Greta Plant

At the Fertilizer section Southern Safety conference in New Orleans on Feb. 28, the Geiger Safety Award was presented to Davison Chemical co.'s Gretna, La., plant. Shown are A. B. Pettit, administrator, industrial health and safety, Davison; Curtis Cox, chairman, Fert. section of the conference; A. J. Brewer, superintendent of the Gretna plant, who accepted the award; J. W. Ground III, Davison Joplin, Mo., district mgr. and E. M. Harold, Gretna, plant mgr. The plant has worked six years without a lost time accident.

FDA Clarifies Tolerance Fees

Fee requirements for establishment of pesticide tolerances were clarified by the Food and Drug Administration in an amended regulation which appeared in the Federal Register April 9.

Two fee payments might have been required in petitions requesting that an old tolerance, considered too low, be repealed and, secondly, that a new, higher tolerance be established, according to wording of the original regulations. The new version states clearly that only one fee payment will be necessary.

Feeco Begins Work on GLF Big Flats Plant

Construction of a modern fertilizer plant for G. L. F. Soil Building Service at Big Flats, N. Y., has been started by Fertilizer Engineering and Equipment co.

According to Feeco president, James E. Madigan, the plant is designed to produce high quality granular fertilizer and will incorporate facilities for storage of both bulk and bagged finished product plus the most modern means of shipping and handling the fertilizer.

Operations are scheduled to begin late this year.

Ag Supply Opens Plant

A new plant has been opened by Agricultural Supply corp. at Thorntown, Ind. Officers of the company, which operates distribution centers at Lebanon and Manson, Ind., are John Docter, president; Robert L. Gatewood, vice president and Harry Weaver, secretary-treasurer.

Chemical Patgrams

A new magazine, CHEMICAL PATGRAMS, is now being published devoted exclusively to chemical process and product patents.

Unique feature of the magazine is that it devotes a separate page to each patent. Its editors analyze the disclosure of every chemical patent and then present this information to the reader in diagram form.

Sample copies may be obtained by writing to CHEMICAL PATGRAMS, Box 5559, Washington 16, D. C.

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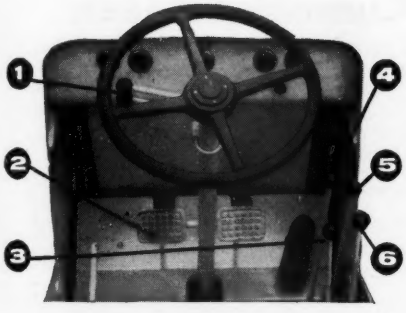

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Shea Plans $5 Million Expansion Program

Designed to double its elemental phosphorus and sodium phosphates production, Shea's $5 million expansion program includes new 20,000 ton phosphorus furnace.

Shea Chemical corp.'s expansion program designed to double its capacity for producing elemental phosphorus and sodium phosphates will cost more than $5 million, according to Vincent H. Shea, president.

The four step construction program, due to be completed by the end of 1956, calls for constructing a second 20,000 ton phosphorus furnace in Columbia, Tenn.; a new phosphate rock washing and preparation plant in the same locality; a new sodium phosphate and phosphoric acid plant in Dallas, Tex., and enlarging the Adams, Mass., plant. Design and construction will be carried out by Shea's engineering staff.

"Key to the expansion program is the construction of the phosphorus furnace," Shea stated. "The additional 40 million pounds of phosphorus it will produce will enable us to expand present facilities and construct the new sodium phosphate plant in Dallas."

Combined output of the two furnaces will be about 40,000 tons of elemental phosphorus annually. Energy will be supplied by the purchase of an additional 33,000 kwh from TVA. Additional facilities for receiving and utilizing inbound raw materials, for phosphorus storage and loading and for handling by-products will be a part of the construction program at the Columbia site.

At Adams, Mass., the firm will enlarge its present phosphoric acid and dicalcium phosphate plant to permit production of organic chemicals based on phosphorus, and to make other specialty products, officials indicated.

Study Shows Potential of Lower Wabash Valley

Chicago & Eastern Illinois RR study shows Lower Wabash River Valley potential for fertilizer, NH_3 industry.

The Lower Wabash River Valley in southwestern Indiana and southeastern Illinois is recommended as an excellent area for the "successful establishment" of the chemical, fertilizer and soap industries in a new, comprehensive study of the area's industrial potentialities made by the Chicago & Eastern Illinois Railroad.

The 460 page report was prepared by Arthur Longini, chief economist for the railroad, and is said to be the most detailed of its kind ever undertaken in the area.

"The importance of the area's fertilizer industry is due largely to Tennessee phosphate rock production," the report states. "The agricultural requirements of the area, however, are not met by production of other important fertilizer ingredients. It appears that nitrogen in the form of anhydrous ammonia might be produced very economically from the surplus natural gas available to the area in summer."

Chemical Progress Week, May 16-21

Theme of the second observance of Chemical Progress Week, May 16-21, will be "A Better America Through Chemical Progress." The program, sponsored by Manufacturing Chemists' Assn., is aimed principally at communities in which the chemical industry is a significant economic factor.

MCA has prepared editorial kits for use in the local press and in company publications. You can aid in bringing home to the public the importance of the industry in your area by assisting the local CPW committee in developing adequate press coverage and by utilizing your own publicity outlets.

New Safety Record For Chemical Industry

A new safety record was set by the chemical industry in 1954, 3.27 lost time accidents per million man-hours worked, according to records of the Manufacturing Chemists' Association General Safety committee.

Lost time accidents recorded decreased 11 per cent compared with 1953, and the accident severity rate declined to 0.49 per thousand man-hours worked, a reduction of 40 per cent over 1953.

Chemical industry accident rate is less than one-third of the 11.50 (per million man-hours worked) preliminary figure reported for all manufacturing during 1954 by the Bureau of Labor Statistics, stated S. M. MacCutcheon of The Dow Chemical co., chairman of MCA's General Safety committee. Since 1946, the industry has reduced its accident frequency rate by 57 per cent.

Use of Benzene in DDT Increased Last Year

About 800,000 more gallons of benzene were used in the manufacture of DDT in 1954 than in 1953, according to a report of the Business and Defense Services Administration, US Department of Commerce.

In 1953, the department reports that 8,589,000 gallons of commercial benzene were consumed in DDT, compared with 9,400,000 gallons in 1954.

Forestry Awards Committee Meets

Members of the Awards committee, American Forestry Association: (left to right) Lowell Besley, AFA executive director; W. M. Abbitt, (D-Va.); Dr. M. D. Mobley, American Vocational Assn.; R. N. Hoskins, Industrial Forester, Seaboard Air Line Railroad; B. C. Browning, Muskingum Watershed Conservancy District; A. R. Spillers, US Forest Service; Louis H. Wilson, American Plant Food Council. The committee is now receiving nominations for five annual conservation awards in the fields of public information, business and industry, public servants, education and general service. Nominations may be submitted to AFA, 919 Seventeenth St., NW, Washington 6, D.C. until June 15. Presentations will be made at Jacksonville, Fla., October 5.

Clarke Cites Fert. Section NSC Accomplishments

Since last October, NSC's Fert. section has increased membership, raised funds for motivation study, reports Chairman Clarke.

Clarke

Some of the objectives accomplished by the National Safety Council's Fertilizer section since the October, 1954, Safety Congress were cited by Thomas J. Clarke, general chairman, in a letter to members of the executive committee. They include:

1. Progress in connection with membership drive. Since October, 21 members have been added.

2. Funds have been raised for the motivation study. Dr. C. W. Nelson of the University of Chicago will have his report ready in October for presentation to the section.

3. New committee assignments: Duncan MacDonald, Anaconda Copper Mining co., and W. H. Henderson, Cooperative Plant Foods, Inc., to the Public Relations committee; M. H. Talbott to Membership committee; B. J. Phillips to Visual Aids and Donald Lind to Statistics and Contest.

4. Chairman Clarke indicated his pleasure at the excellent Southern States Fertilizer section meeting in New Orleans.

5. A new plan for the FERTILIZER NEWSLETTER jointly edited by Tom Clarke and Billy Creel, safety director of the North Carolina Department of Labor, has been well received.

The next meeting of the section's Executive committee will be held on June 11 at Roanoke, Va.

RR Fertilizer Rate Scale

In order to meet water and truck competition, rail carriers in Official Territory will, on April 10, establish a scale of rates on fertilizer and fertilizer materials, according to a report recently included in the NFA NEWS from R. T. Smith, chairman of National Fertilizer Association's Traffic committee.

Setting up of the rate scale will smooth out variations in rate scales between Central Freight Association and Truck Line Territories.

Texas' Natural Resources Color Film Now Available

A newly revised and condensed version of "Texas and Its Natural Resources," a 16 mm. film in sound and color, has been added to the list of Bureau of Mines motion pictures produced under its Government-industry cooperative film program.

Made in cooperation with Texas Gulf Sulphur co., it runs 27 minutes. Prints now are available for short term loans to business and service clubs, civic and trade associations, schools and colleges and other organized groups.

Like other films in the bureau's catalog, "Texas and Its Natural Resources" was financed entirely by the sponsoring company, which defrayed all costs incidental to production and provided the bureau with prints.

Canadian Pesticide Situation

By 1960, pesticide sales are expected to be $24 million. US was source of 90 per cent of all pesticide imports in 1953. Commerce dept. suggests US exporters increase attention to promotion and marketing, give more care to selection of agents and distributors.

Latest in the series of US Department of Commerce reports on the world pesticide situation is a survey of Canadian consumption and production. The agency states that sales are expected to increase a million dollars a year to $24 million by 1960, and one industry estimate is said to place annual demand for all pest control products as high as $50 million.

Production of raw materials involves only about a half dozen products: 2,4-D acid, 2,4,5-T acid, phenothiazine and some dithiocarbamates from Naugatuck Chemical co., Elmira, Ont.; copper sulfate from Consolidated Mining & Smelting and Canadian Copper Refiners; and limited quantities of lead and calcium arsenates.

About 50 formulators are registered, four of which are large producers, and most are subsidiaries of US firms. Most material sold under US brands is actually mixed or formulated in Canada.

Although shipments in 1953 arrived from the United Kingdom, Germany and Japan, the US was the source for about 90 per cent of Canadian pesticide imports. Although US surplus capacity has forced down prices of Canadian products, there has been no organized pressure for tariff protection, states the report, and no duty is placed on non-alcoholic pest control product imports in packages of over three pounds gross. Those of three pounds or less are subject to a most-favored-nation rate of 12½ per cent ad valorem.

Suggestions to US exporters include increasing attention to promotion and marketing, more care to selection of agents and distributors, concentration of specific products for particular sales areas and more research and testing for materials especially adapted to Canadian requirements.

DDT & Phosphate Insecticide For Corn Earworm Control

Both a phosphate insecticide (OS2046) and DDT have been used to control corn earworms damaging sorghum heads, despite the protection the worms get from the heads while feeding on them.

C. C. Burkhardt, entomologist at Kansas State College, said the phosphate insecticide killed 96 per cent of the worms within 24 hours after application and 100 per cent within 72 hours. DDT killed 84 per cent within 24 hours; 95 per cent within 72 hours.

In the same tests at the Kansas State Agronomy farm, endrin and lindane killed 72 and 90 per cent, respectively, of the corn earworm larva within 72 hours. Toxaphene, parathion and heptachlor were reported less effective.

King Size Safety Banners Now on Sale

NSC now is making giant-size safety banners for use indoors and outdoors. A set of 12, one for each month, is available by subscription.

Now you can get your safety message in king size, reports the National Safety Council. It has added giant-size accident prevention banners, 10 feet long by 3½ feet deep, to its stable of safety training aids.

Banners come in two styles—one for indoors made of heavy display duck with eight metal grommets for ease in mounting and an outdoor style made of extra heavy duty duck, weatherproofed and vented, with full length ropes stitched in top and bottom for secure fastening.

Twelve banners—one for each month of the year— are available on an annual subscription basis. For information on prices and a flyer showing miniatures of many of the banners, write to NSC, 425 N. Michigan Ave., Chicago 11, Ill.

Agrees to FTC Ruling

Bug-A-Roo, Inc., 2711 Commerce St., Dallas, Tex., has agreed with FTC to stop advertising that its three insecticides, "MiraKil," "Lite-N-Bug" and "Little Giant" will rid premises of bugs or insects.

Vote Standards for Sizes of NC Fertilizer Bags

After public hearings in Raleigh, N. C., on March 7, The North Carolina State Board of Agriculture voted to establish five standard sizes of fertilizer bags and to amend a regulation relating to use of urea in mixed dairy feeds.

Sizes of bags authorized are 200 pounds, 167 pounds, 125 pounds, 100 pounds and 50 pounds.

Maximum amount of urea and ammoniacal nitrogen permitted in dairy feeds is increased slightly in the amendment to the feed regulations, but it circumscribes their use with limitations on the fibre content of such feeds.

Potash Institute Issues New Deficiency Booklet

A booklet, *Potash Deficiency Symptoms*, recently published by the American Potash Institute, is designed to help identify deficiencies of potash in various crops.

Compiled by R. H. Stinchfield, editor of *Better Crops with Plant Food*, the booklet contains more than 50 pages, 26 in four colors.

The new publication is available in quantity at cost, $13.43 per hundred, from API, 1102 Sixteenth St., NW, Washington, D.C.

Douglas Markets Tetrakote

Douglas Chemical co. has received permission from Kansas State to market a new grain protectant in 22 wheat-growing states under the name Tetrakote.

Developed after five years' research, the protectant is particularly effective against the cadelle beetle, the saw-tooth grain beetle, flat grain beetle and other grain insects, according to Donald A. Wilbur, professor of entomology at Kansas State College.

Hygro Liquid Fertilizer Holds Farmer Meeting

Hygro Liquid Fertilizer corp. held an open meeting at Converse, Ind., town hall in late March to explain its complete liquid fertilizer to interested farmers.

The firm's sales manager, Lloyd Baker, has reported that Hygro products will be sold only through farm dealers who are equipped to provide custom applications, and who have trained personnel available at all times to provide information on the plant food.

First NH_3 Shipped from Houston Port by Phillips

The first ocean-going movement of anhydrous ammonia to originate at the Port of Houston left from Phillips Chemical co.'s Adams Terminal when a dual purpose ocean-going barge, the "Port Everglades," recently loaded some 1,300 tons of ammonia destined for Ochoa Fertilizer corp.'s facilities at Guanica, Puerto Rico.

Report Study on SO_2 Removal by Ammonia

At the First International Congress on Air Pollution recently held in New York, results of a pilot plant study on the use of ammonia for removing sulfur dioxide from flue gases were reported by H. E. Newall of the Fuel Research Station of England.

The pilot plant scrubs the flue gas with a concentrated solution of ammonium sulfate, sulfite, bisulfite and thiosulfate. Eighty per cent removal efficiencies have been reported with a single-stage process and 95 per cent with a two-stage process. Sulfur is recovered in the form of ammonium sulfate and elemental sulfur.

FOA Authorizations

India. Project agreements have been signed to help India procure 58,500 tons of chemical fertilizers (ammonium sulfate, ammonium sulfate nitrate, urea and nitrochalk nitrate sulfate). Agreements call for expenditure of $5,151,000 for fertilizers and fertilizer demonstration project. It is proposed that ammonium sulfate will be imported in Jan. and Feb., 1956, and the other materials by Sept. of this year.

India. $1,151,000—nitrogenous ($1,117,000) and potash ($34,000) fertilizers for demonstration project. PIO/C No. 86-13-001-5-50062). Ending delivery date—Dec. 31. Source—World wide procurement through Emergency Procurement Serv., GSA.

Iraq. $1,500—agricultural pesticides (PIO/C No. 66-11-001-9-50297). Source—USA & poss. (Emer. Proc. Serv., GSA).

Turkey. $1,000,000—agricultural pesticides. (PA No. 77-236-00-74-5002). Contract period—April 4-May 31. Ending delivery date—June 30. Source—USA & poss. This authorization may be used only for commodities such as concentrated forms of DDT, BHC, HCB, methyl bromide and Strychnine Sulfate.

Vietnam. $1,425,000—potash ($150,000) and phosphate ($1,275,000) fertilizers. (PA No. 30-99-70-5004). Contracting period—March 15 to May 15. Ending delivery date—Sept. 30. Source—World wide.

Unless otherwise specified, procuring agency is assumed to be recipient country, its authorized agents or importers. PIO—project implementation order. PA—procurement authorization.

OVERSEAS

England. Imperial Chemical Industries Ltd. is abandoning efforts to develop the North Yorkshire potash deposits after seven years of effort and expenditure of $1.1 million. The sylvenite deposits, located at a depth of 4,000 feet, are estimated to contain 100 million tons of KCl if extracted at 30 per cent efficiency; however, ICI could not accomplish extraction because of a difference in solubilities of the two sylvenite salts.

ICI stated that the potash can only be developed by special deep-mining techniques not possessed by its organization.

Israel. A $2.5 million chlorine and caustic soda plant now under construction by Electrochemical Industries (Frutarom) Ltd., ten miles north of Haifa, will be in production in late 1955. Maximum daily output will include five tons of 13 per cent gamma BHC.

Japan. Goals of the Chemical Fertilizer div., Ministry of International Trade and Industry include production of 3.32 million tons of ammonium sulfate and 650,000 tons of calcium cyanamide by 1957. Exports by the end of 1957 will total 470,000 and 120,000 tons each.

Mexico. Initial shipment of sulfur from its new units on the Isthmus of Tehuantepec has been made by Mexican Gulf Sulphur. The US-financed firm loaded 3,500 tons at the port of Coatzacoalcos for delivery to the National Sulphuric Acid Association of London. This was the first of an estimated 500,000 tons to be produced by Mexican Gulf and two other firms during 1955.

Pakistan. The Nowshera caustic soda plant and DDT facility has begun operation in the Northwest Frontier province. Financed by the WHO and UN's International Childrens Emergency Fund, the DDT unit has an annual capacity of 700 tons, with smaller quantities of hydrochloric acid, dichlorobenzene and trichlorobenzene.

Phillipines. On Aug. 29 last year the Maria Cristina hydroelectric power plant and fertilizer works began ammonium sulfate production, the first manufactured in the Phillipines. Capacity of 36,000 metric tons yearly will be raised to about 50,000 tons with addition of more equipment. Plans call for an increase eventually to 100,000 tons.

Portugal. The Department of Commerce reports that programs to increase production and use of fertilizers are

being actively promoted. Supplies of superphosphate are adequate, but Portugal depends on imports for part of its nitrogenous fertilizers.

Last year the Minister of Economy outlined a six-year plan calling for an increase in nitrogen capacity to 52,575 metric tons. A nitric acid plant is slated, which will permit production of nitrate fertilizers.

Tasmania. Electric power will delay operation of the new ammonium sulfate plant of Electrolytic Zinc co. of Australasia Ltd. at Risdon. Although the plant is nearly completed, power is not expected to be available until mid year.

People

Stewart A. Washburn, formerly with the National Safety Council, has been appointed general manager of the **American Visuals corp.'s** newly formed Technical div., Inc.

Carl F. Hagedorn, who for more than 50 years has served **Armour Fertilizer Works** as head of the Manufacturing dept., retired on April 1. He is succeeded by Robert White.

Successor for Harry C. Moore, whose retirement as director of purchases was announced last month, is John C. Watt.

California Spray-Chemical corp. has named Dr. Robert Kruger Thompson coordinator of western research, with headquarters at Richmond, Calif. Dr. Thompson started with Calspray in 1950 as research entomologist at Orlando, Fla., then was transferred to Haddonfield, N. J., as eastern coordinator of research.

R. C. Boltz and G. E. Kuehn have been named sales managers at Newark, N. J. and Buffalo, N. Y., respectively, by **Carbide & Carbon Chemicals co.**

Transfer of the following technical representatives has been announced: G. S. Cooper to New York from Pittsburgh; J. W. Locher to Pittsburgh from Indianapolis and B. W. Hurley to Indianapolis from Cincinnati, O.

Richard C. Back has been named entomologist for agricultural chemicals development, **Carbide and Carbon Chemicals co.**

Davison Chemical co.'s president, Marlin G. Geiger, has been named chairman for Maryland observance of Chemical Progress Week, May 16-21.

George V. DuPont has been named Diamond Black Leaf co. manager of manufacturing operations, according to an announcement by **Diamond Alkali co.**

Promotion of Robert C. Sutter to assistant director of engineering for Diamond Alkali and Edward J. Loeffler, Jr., to chief group engineer for the Central Engineering dept.'s Painesville section, succeeding Sutter, also was announced.

William D. Milsop has been elected general manager of **Eastern States Farmers' Exchange,** succeeding Quentin Reynolds, who has retired. New assistant to the general manager is Addison L. Clark, formerly in charge of farm supply procurement.

Evans Research and Development corp. has appointed Walter W. Edman associate director of research.

Recently elected to **Food Machinery & Chemical corp.'s** board of directors: Carl F. Prutton, vice president and technical director of chemical divisions.

Harry E. Baldridge has been named a sales representative for **Frontier Chemical co.** with a territory including Kansas, Oklahoma, Arkansas and Louisiana. He joined the company in 1952 as chief chemist of the Wichita, Kan., plant.

McCloskey

William B. McCloskey has been elected a vice president of **W. R. Grace & co.,** where he will be in charge of the Administrative Controls div. Formerly vice president in charge of chemical operations for Davison Chemical co. div., he now will make his headquarters in New York City.

Died: V. R. McCoy, president of **The M. Hamm co.,** on March 26.

H. B. DuBois has been named assistant manager of the Consolidated Felspar dept. of **International Minerals & Chemical corp.'s** Industrial Minerals div. He is succeeded as sales manager by W. K. Burriss.

W. F. Munnikhuysen has been elected chairman of **Koppers co.'s** board of directors and Fred Foy, president, filling vacancies created by the death of Gen. Brehon Somervell.

Newly appointed assistant vice president for **Koppers co.'s** Chemical div. is Cooke Bausman, Jr.

Mallinckrodt Chemical co.'s secretary, John E. Gaston, has been elected a vice president of the firm. Former assistant secretary and assistant treasurer John G. Moore has moved up to vice president and assistant treasurer; Victor H. Knoop, secretary and Oliver H. Langenberg, assistant secretary.

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Paul A. Miller has been named director of extension in **Michigan,** succeeding D. B. Varner who has become vice president of Michigan State College.

Robert H. Engle, film director for **National Fertilizer Association,** again was a judge at the Golden Reel Film Festival held at the Waldorf Astoria hotel in New York City April 4-8.

Died: Earl Willis, western sales manager, **Nitrogen div.,** Allied Chemical & Dye corp., on March 15.

Ralph Wechsler has been elected president of **Nopco Chemical co.,** succeeding Thomas A. Printon, who will continue as chairman of the board. Associated with Nopco since 1921, Wechsler had been treasurer of the company prior to his recent election.

Olin Mathieson Chemical corp.'s board chairman, John M. Olin, has joined the board of directors of Keep America Beautiful, Inc., the national public service organization for prevention of litter.

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Hodgson

Sales managers in the agricultural chemicals divisions of **Olin Mathieson Chemical corp.** have been named by the company.

R. H. Hodgson, has been appointed manager, retail sales, of the Eastern Fertilizer div.; Donald T. Fangmeyer, manager of the division's Wholesale Sales dept.; G. D. Baerman, manager of agricultural sales in the expanded Insecticides div.; Paul Williams, assistant manager; Alfred Weed, manager of the Household Sales dept. Both the Eastern Fertilizer and Insecticides divisions are headquartered in Baltimore.

Baerman

In the Western Fertilizer div., G. A. Wakefield is sales manager and Paul F. Schowengerdt, assistant sales manager. David Dickey is sales manager for the Western Sulphur and Acids divisions. These divisions are located in El Dorado, Ark.

Wakefield

J. F. McLaurin has been appointed sales representative for finished insecticide products in South Carolina by **Olin Mathieson Chemical corp.** In addition, he will serve as a consultant for the company in cotton and tobacco areas throughout the US.

A revision of midwest and southwest sales territories of **S. B. Penick** and New York Quinine & Chemical Works, its affiliate, has just been completed.

With headquarters in Dallas, Tex., Ralph B. Dysart serves both companies in Texas, Oklahoma, Arkansas, Louisiana and New Mexico. The area of south Chicago, northern Indiana, eastern Illinois, is covered by Harold B. Nero.

Watson

J. Drake Watson has been transferred from Florence, S. C. to **Pennsylvania Salt Mfg. co. of Washington's** Tacoma headquarters as assistant to the agricultural chemicals manager. Watson was district manager for Penn Salt's Agricultural Chemicals at Montgomery, Ala., before Korean recall to active duty as an Infantry major. Upon returning, he assumed duties as district sales manager, agri-

[redacted]

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Your first glance will tell you why its fine, uniform and virtually dust-free texture gives such improved results — promotes better granulation in high analysis plant foods — reduces the need to grind before mixing — assures thorough and more complete ammoniation.

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cultural chemicals, for North and South Carolina with offices in Florence.

Hugh C. Land will succeed William P. Drake as head of the **Pennsylvania Salt Manufacturing co.'s** Industrial Chemicals div., the company has announced. Drake recently was named Pennsalt executive vice president.

Russell J. Eggert, **Pennsalt's** B-K sales and service representative in Arkansas and eastern Tennessee, has been named regional sales supervisor for the company's south-central territory. Allan Peerless replaces him as sales-service rep.

Other changes in the B-K dept.: J. M. Foss to Atlantic seaboard area as territory sales supervisor; W. C. Carpenter to mid-west territory with Chicago headquarters as regional sales manager; J. R. Brower, Jr. assigned to sales staff, eastern Mich. territory and R. P. Peyran named sales-service rep. for Washington state.

Roy E. Wilson has been named resident sales and service representative for **Pennsalt's** B-K products. He will have charge of the company's Florida territory with headquarters in Orlando.

Richard E. McLeod has been appointed West Coast regional sales manager for **Chas Pfizer & co.'s** Agricultural Sales division. He joined the company in 1952 as one of the first salesmen of the then newly formed division.

Pfizer Laboratories, division of Chas. Pfizer & co., has named Edward Whitney director of advertising. Aiken Toffey succeeds him as advertising manager for the division and Norman Sprei has been named assistant manager.

Scott

John A. Scott has been elected president of **Sinclair Chemicals, Inc.** a subsidiary of Sinclair Oil corp. He has been executive vice president and a director of the company since 1952 and a member of the Sinclair organization since 1934.

Wise

New Alabama representative for **Spencer Chemical co.** is Ulay K. Wise, who has just completed a three-year tour of duty with the State dept. He also has been with the Veterans Administration, in charge of a unit administering the on-the-farm training program and as agricultural training officer.

M. H. Straight, **Spencer Chemical co.** advertising manager, has been elected chairman of the Association of National Advertisers' Chemical group.

Straube

Harold L. Straube has been appointed to the Agricultural Sales div. of **Stauffer Chemical co.** An entomology graduate from the University of Massachusetts, he was associated with John Powell & co. from 1940 until 1955, most recently in the position of operations manager in charge of production and purchasing.

Stauffer Chemical co. has named A. M. Powell assistant production manager in charge of eastern sulfur and insecticide plants. He will headquarter at Chauncey, N. Y.

Arthur F. Miller, general manager of the Plant Food div. of **Swift & co.** since 1947, retired on April 1. He is succeeded by William F. Price, who has been assistant manager of the division since 1952. Miller began his 43 year career with Swift as secretary to the manager of the Plant Food div. Under Miller, Swift began marketing Vigoro, now the largest home and garden seller in the country, the company reports.

Price

Price joined Swift in 1925 at Calumet City, Ill., as a sales representative for the Plant Food div. He became sales manager of the Pacific Coast area in 1929 and later managed plant food factories at Ontario, Calif., and Los Angeles.

Died: Raymond Hutchinson, manager of **Trenton Bone Fertilizer co.,** on March 14.

Following the death of **Triangle Chemical co.'s** president, J. R. Maddux, Harry E. Johnson, executive vice president, was named president, Richard H. Maddux, vice president and R. W. Jones, secretary and treasurer.

Arnon L. Mehring has been named to head the fertilizer work of the Commodity Stabilization Service, **USDA** has announced. He will make a continuing study of supply-demand conditions and will edit the annual "Fertilizer Situation" report.

Kapusta

United States Potash co. has announced appointment of Dr. Edwin C. Kapusta as technical service director, effective July 1.

Dr. Kapusta has been with The National Fertilizer Association as its chemical engineer since July, 1951. He is a graduate of Rensselaer Polytechnic Institute, was awarded his Masters Degree from Worcester Polytechnic Institute and his Ph.D. in chemical engineering from Iowa State College.

He now is in charge of NFA's work in the field of technical service and research on fertilizer manufacturing technology, involving liason between NFA and state, Federal and private agencies engaged in such studies.

W. E. Zimmerman has been appointed **Velsicol corp.** sales representative in Florida, with headquarters in Orlando.

Virginia-Carolina Chemical corp. personnel moves: R. Andrew Jenkins to assistant manager of the Baltimore sales office; H. W. Hoffman to assistant to the manager of the Shreveport sales office; Charles H. Freeman to assistant superintendent at the Shreveport, La., factory.

Died: James W. Schofield, former production manager for Black Leaf Products div. of **Virginia-Carolina,** on Feb. 26 in Richmond.

Randolph Keim and Archer L. Wombacher have joined the agricultural staff of **Wilson & Geo. Meyer & co.** and will work out of the company's San Francisco office.

Company Briefs

Charter of incorporation has been filed by **A. A. A. Ammonia Service, Inc.** at Dover, Del., listing authorized capital stock of $100,000.

A National Safety Council Award of Honor has been presented **American Potash & Chemical corp.** for its 1954 safety record which was 89 per cent lower than NSC's "par accident rate." AP&C held lost-time accidents during 1954 to a low frequency of 2.1 as opposed to the par rate of 5.0.

American Potash and Chemical corp. has moved its Eastern Sales div. to expanded new quarters at 99 Park Ave., Manhattan. The offices, which

include a communications room, cover 5,415 square feet of air-conditioned space on the 15th floor.

Dedication ceremonies marking opening of the new **Atlas Powder co.** food emulsifiers plant at Memphis, Tenn., were held on March 25. Mono- and di-glycerides will be produced at the new facility.

A branch office and warehouse have been opened by **Barada & Page, Inc.** at Odessa, Tex.

Drs. R. D. Wessel and R. K. Thompson represented **California Spray-Chemical corp.** at a three-day meeting recently held in Zurich, Switzerland. Hosted by California Spray-Chemical Compagnie Francaise, the session was attended by 40 people representing Calspray agents in 12 European countries and Egypt.

The company reports that delegates unanimously agreed that Orthocide was outstanding in control of scab and that it produced heavier crops of better quality. Dr. Wessel, a research entomologist from Lockport, N. Y., will remain in Europe to arrange further test programs. After an eight month study of plant disease problems in Europe, Dr. Thompson, coordinator of research, Haddonfield, N. J., has returned to the US.

An ammonia plant, reported to be the largest of its kind in Canada, will be constructed at Millhave, near Kingston, Ont., according to an announcement by Harry D. Callan, secretary-treasurer of the Eastern Ontario Development Association. Capacity of the new plant, on which construction is to begin shortly, is expected to be 66,000 tons of ammonia annually. **Canadian Industries, Ltd.** will use the product in production of fertilizer and explosives.

Climax Molybdenum co. has announced a complete realignment and expansion of its Sales dept. Three new domestic divisions have been created —Direct Sales, Metallurgical Market Development and Chemical Market Development.

Curry Chemical co., a wholly owned subsidiary of Phillips Petroleum co., has announced plans for immediate construction of a 40-ton per day liquid mixed fertilizer plant near its dry fertilizer mixing facilities at Scottsbluff, Neb. The new plant, expected to be in operation by late spring, will be primarily a developmental facility to provide fundamental information on the subject and to acquaint interested fertilizer distributors with the techniques and economics of liquid mixed fertilizer manufacture and marketing.

Earnings of **Diamond Alkali co.** in 1954 totaled $5,528,600, equivalent to $2.21 per common share, compared to 1953 earnings of $5,939,189, or $2.39 per common share, according to the firm's annual report.

The Chlorinated Products div. report states that construction of a monochlorobenzene plant and major revamping of the company's 15 per cent BHC plant at Greens Bayou are expected to have a favorable reflection on 1955 earnings, as well as development and introduction of a non-flammable grain fumigant.

DuPont co. reports that the world's largest single unit for production of sulfuric acid has been brought into commercial operation at its Grasselli Chemicals dept.'s East Chicago Works.

The new unit, under construction since last August, was built by the DuPont Engineering dept.

Charter of incorporation has been granted **Fertilsoil corp.,** 1905 Sterick Building, Memphis, Tenn., listing capital stock of 1,000 shares at $100 each.

Net earnings of **Freeport Sulphur co.** during 1954 amounted to $10,083,938 or $4.20 per share of common stock, an increase over the $8,536,335 or $3.56 per share reported for 1953.

The company's annual report stated that National Potash co., in which Freeport has an interest, soon plans to begin sinking mine shafts and constructing a mill to process ore.

In April, **Gallowhur Chemical corp.** was to move its New York office to the Ossining, N. Y., plant and laboratory site. The company has named John H. Holton, Jr. its general manager, responsible for all phases of Gallowhur operation.

H. Clay Glover co. has moved to the Meadowbrook National Bank Bldg., West Hempstead, L. I.

A charter from the Secretary of State has been obtained by **Greenmont Liquid Fertilizer co.,** Inc., Montgomery, Ala.

Harris Laboratories, Lincoln, Neb., has installed an Agricultural div., headed by Wilbur A. Layman, offering research and analytical services to the fertilizer, insecticide and cereal industries.

Earnings of **Hercules Powder co.** during 1954 were $14,140,070 or $5.10 per share, compared with $11,680,854 in 1953. Sales decreased about 1½ per cent.

Agricultural chemicals accounted for about 7 per cent of the company's sales in 1954, compared with 4 per cent in 1953.

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Market Research Division, Doane Agricultural Service, Inc., Box 977, 5142 Delmar Blvd., St. Louis 8, Mo. (Telephone: FO 1-2800)

Hercules Powder has completed a new 11-minute film titled "Design for a Laboratory—A Venture in Research," which takes viewers on a quick tour of the new Hercules Agricultural Chemicals Laboratory.

An explosion is reported to have caused about $25,000 damage at **Hugh-Johnson Chemical co.'s** Portland, Ore., plant.

A charter of incorporation has been filed by **Humble Sulphur co.** at Dover, Del., listing authorized capital stock of $1,000.

International Minerals & Chemical corp. has begun construction on a nepheline syenite plant to cost $1.5 million at Blue Mountain near Havelock, Ontario. Scheduled for completion late this year, the plant will be operated

Classified

FOR SALE: Forty-ton Sturtevant Acidulation Unit. In operation two years, nearly complete unit, good condition. Inquire Buhner Fertilizer Company, Box 152, Danville, Illinois.

by Consolidated Feldspar dept. of IMC's Industrial Minerals div.

Sulpfur is being produced in Manderson, Wyo., by **Jefferson Lake Sulphur co.** at a plant with 150 long tons per day capacity. Initial production rate was 60 to 70 tons, and it is expected to be increased gradually. Sulfur is recovered from hydrogen sulfide produced by nine oil companies.

Plans for erection of a three-building laboratory adjacent to the newly opened development plant at Kobuta, near Pittsburgh, Pa., have been announced by **Koppers co.**

Testing and developing of products coming from the firm's Verona, Pa. plant will be carried out at the new lab, and construction is scheduled to begin within a few months.

Lion Oil co.'s net income for 1954 was $11,071,426 or $3.58 per share, compared with 1953 earnings of $10,688,260 or $3.46 per share, according to the company's annual report.

Total net tons of N sold increased 18 per cent and net receipts from sales, 23 per cent over the previous year.

Volume at the El Dorado chemical plant reached an all time high with anhydrous ammonia produced at an average rate of 582 tons daily. Storage facilities consisting of four ammonia spheres with total capacity for about 6,500 tons, and a 6,000 ton tank for ammonium nitrate solution were added to the plant.

The Barton plant did not go into production in time to take advantage of the spring demand for nitrogenous materials and as a result much of the production went into inventory for later sales.

Outlook for 1955 is that demand throughout the fertilizer year should absorb accumulated inventories and current production of all nitrogen materials made by the company.

Miller Chemical & Fertilizer corp.'s Baltimore, Md., plant was reported heavily damaged by an explosion on March 17.

Executive and sales offices of **Minerals & Chemicals Co. of America** will be moved from Philadelphia to Menlo Park, N. J. where an $8½ million home office and research building is now being constructed.

National Potash co. has filed a charter of incorporation at Dover, Del., listing authorized capital stock of $4 million.

Nitrogen Products, Inc. has issued a carload price list for nitrogen fertilizers east of the Rocky Mountains. Including price net ton, basis and price unit N, the list is available from Nitrogen Products, National Bank Building, New Brunswick, N. J.

Net earnings of **Olin Mathieson Chemical corp.** and its consolidated subsidiaries in the US and Canada in 1954 were $34,292,000, an improvement of nearly 14 per cent over 1953 earnings of $30,093,000.

Agricultural chemicals sales increased over those in 1953, the company's annual report states.

A district sales office has been opened by **Pacific Coast Borax co.** at 4010 Washington St., Kansas City, Mo. to handle package, agricultural and industrial sales. Package dept. sales manager is Howard B. Cain; Agricultural Sales div., F. M. Dosch, assisted by J. G. Neckerman; Industrial Sales div., Jack Loessel.

Value and volume of **Phillips Petroleum co.** fertilizer sales increased more than 50 per cent in 1954, reflecting added output available from plants which started operations about the first of that year, according to the company's annual report.

Production of anhydrous ammonia averaged 845 tons per day, 67 per cent over 1953, reflecting operation of the new 465-ton per day Adams Terminal ammonia plant. Ammonium sulfate production of 789 tons daily was 123 per cent higher than in 1953, due in part to installation of new equipment at Adams Terminal. The Cactus plant in the Texas Panhandle turned out an average of 449 tons per day of ammonium nitrate and nitrogen solutions, compared with a daily average of 337 tons the previous year.

Phillips Chemical ammonium nitrate is now available in polyethylene lined 80 and 100 pound, multi-wall bags designed to assure a free, flowing and easy-to-use product.

Rick Helicopters moves from 13440 S. Central Ave., Los Angeles, to P. O. Box 217, Airport Branch, San Francisco International Airport, San Francisco, Calif. Telephone numbers: Juniper 6-3125 and Juno 8-3871.

A new sales office has been opened by the Agricultural Chemicals div. of **Shell Chemical corp.** at 1220 Goodale Boulevard, Columbus, O. Under the direction of S. J. Hastings, district manager in New York, the office will be headed by J. H. Hawke with C. J. Green and technical salesman.

Headquarters of **Shell Chemical corp.'s** Agricultural Chemicals div. will be moved from Denver, Colo., to 460 Park Ave., New York City around May 15. While the plant for manufacture of insecticides will remain in Denver, transfer of the Sales div. is designed to insure greater access to national markets and will afford better coordination of the various marketing activities, the company reports.

A warehouse will be built this summer by **Simplot Soilbuilders** for housing bagged fertilizer materials, stated Grant Kilbourne at a recent meeting of Soilbuilder managers and field sales representatives in Pocatello, Ida.

Also heard at the meeting were talks by Ben McCollum, sales manager and J. D. Wursten, Idaho Falls Soilbuilder manager.

Smith Agricultural Chemical co. president, John E. Powell, has retired as president and has been elected chairman of the board of directors. William F. Farley, vice president, succeeds him as president.

Powell joined the company in 1904 as an errand boy, was placed in charge of production in 1914, named vice president in 1917 and was elected president in 1944.

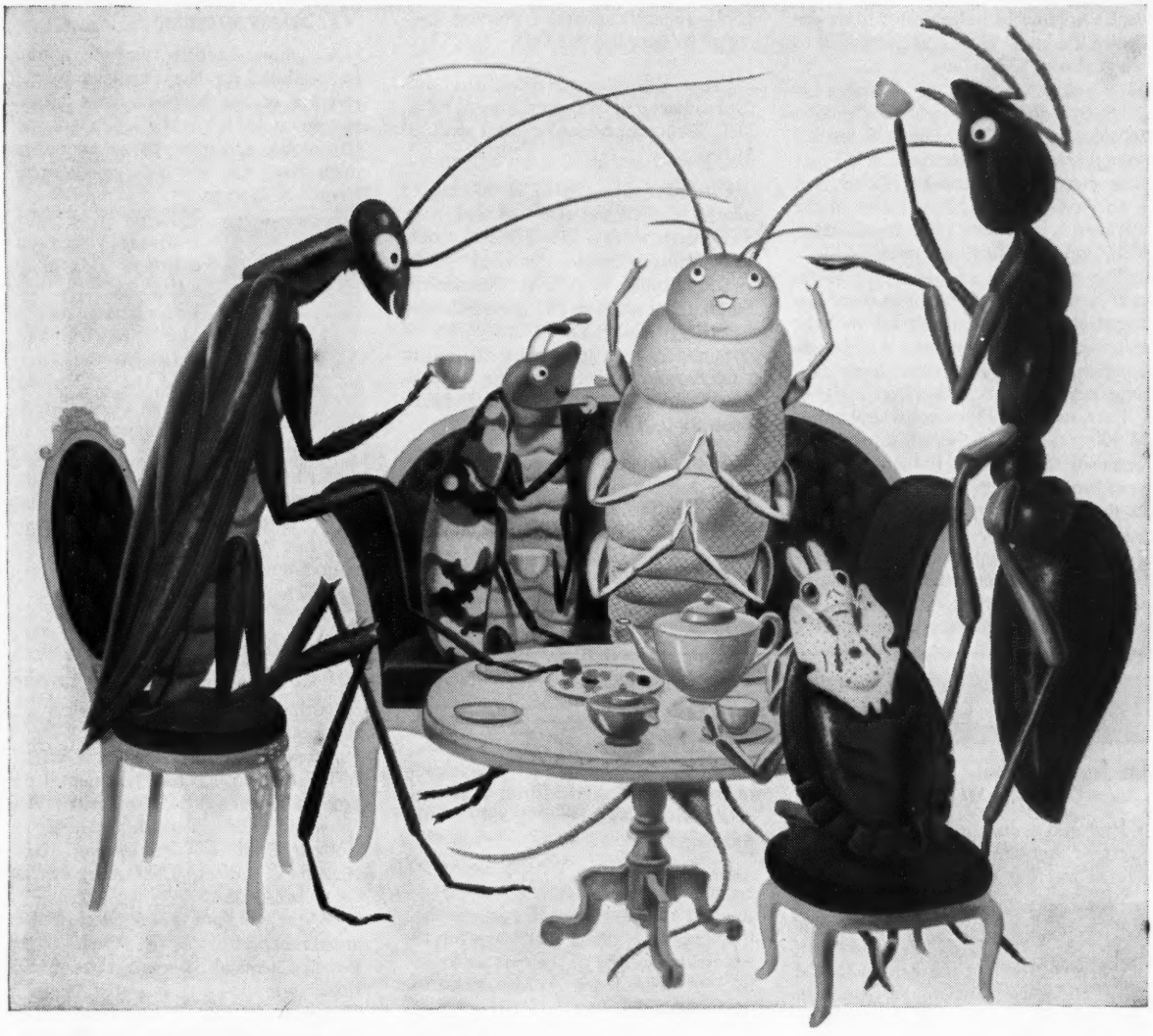
Smith-Douglass co.'s safety record for January 1 to 28, 1955 shows three lost time accidents, equal to the number reported for the same period of 1954. The company's Tenoroc, Lakeland, Fla., team lead the safety league with no lost time accidents in 78,111 man hours.

Southeastern Liquid Fertilizer co., Albany, Ga., has acquired the Brooks Chemical co. of Quitman, formerly owned by E. M. and Q. M. Mathis. Included in the transfer was the bulk plant and a portion of equipment. Harry Jenkins of Albany is the new manager for the Quitman operation.

With the completion of its permanent underground installations and a number of improvements in its plant, **Southwest Potash corp.** satisfactorily ended its second full year of operations, according to the annual report of The American Metal co.

SW Potash's production for the past two years has averaged 85 per cent of capacity, the parent company reported, and sales in 1954 were somewhat greater than in 1953, although overall costs increased as a result of higher wages and sales development expenses and an enlarged research program to develop new and improved products.

A seven per cent increase in sales for the fiscal year ending June 30, 1955, over those of the preceeding year has been predicted by **Spencer Chemical co.** Sales totaled $34.1 million for the fiscal year ended June 30, 1954, and this



How to get rid of these **uninvited guests!**

COCKROACHES, ants, silverfish and other insect free-loaders have a habit of "dropping in" where they're least wanted. When that happens, your customers expect *you* to get rid of them promptly and permanently

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year's volume including sales from the new Vicksburg Works, is expected to reach almost $37 million.

Of **Stauffer Chemical co.'s** 1954 record sales of $82,582,000, $20,208,000 were agricultural chemicals, a 13 per cent increase over the 1953 level. In both 1954 and 1952, 28 per cent of the company's sales were agricultural chemicals, and in 1950, 29 per cent.

The company's annual report states that new insecticide facilities, new distribution channels and expansion of the sales organization enabled Stauffer to enter important new market areas during the year.

Late last year, Stauffer became owner of 100 per cent of the voting stock of Consolidated Chemical Industries, whose sales and earnings in 1954 were the largest in that company's history.

Tennessee corp. has signed a contract with the Atomic Energy Commission for sale to AEC of uranium extracted in the process of producing triple superphosphate, according to report in the NFA NEWS.

Ultra Chemical Works, Inc. has filed a charter of incorporation at Dover, Del., listing authorized capital stock of $1,000.

United States Steel is offering to dealers this season two new full color pamphlets written on a more profits from nitrogen theme. Entitled "Make Bigger Profits with USS Ammonium Sulphate" and "How to Figure Nitrogen for Bigger Corn Yields" they can be obtained in quantity for distribution to your customers from the USS Agricultural Extension Section, 525 William Penn Place, Pittsburgh 30, Pa.

At the Charleston Industrial Exposition, **Virgina-Carolina Chemical corp.** built its display around its chemicals and fertilizers. About 14,000 persons from the Charleston area attended the exposition.

This year V-C is celebrating its sixtieth anniversary.

Va. Safety Program

A Seminar-Lecture type of program is scheduled for the Fertilizer section meeting of the Virginia Safety Association on June 3 in the Jefferson hotel, Richmond, according to an announcement from the section's co-chairman, Vernon S. Gornto.

Crosby

Ralph J. Crosby, assistant vice president of Marsh & McLennan, Inc. will be in charge of the entire program. Very active in the safety field, he has served Marsh & McLennan as manager of its Safety Engineering dept., has conducted supervisory training courses in accident prevention throughout the country for the company and has been a frequent speaker at national and local safety council and ASSE chapter meetings.

Associations & Meetings

Decker to Speak At WACA Meeting

Featured as luncheon speaker for the Western Agricultural Chemicals Association meeting to be held June 21 in the Hotel Clark, Los Angeles, is Dr. George C. Decker, president of the Entomological Society of America. He will discuss "Integration of Industrial and Governmental Research on Pesticides." A talk on "Package Deals" will be delivered by John F. Neace, manager of Marsh Aviation co.

Decker

Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association, will be a guest at the morning business session.

C. O. Barnard, WACA secretary, reports that the meeting will be adjourned no later than 3 p.m. so that members and guests can leave for the Riverside meeting of the Entomological Society of America which starts the next morning.

New MCA Member

New member of the Manufacturing Chemists' Association is General Aniline & Film corp., New York City, MCA reports.

Stone Named Chairman Of So. Safety Group

During meetings of the Fertilizer section, Southern Safety conference, William H. Stone, plant superintendent of Wilson & Toomer, was elected chairman of the group for next year. Also elected were Quentin S. Lee, assistant manager of Cotton Producers Association, vice-chairman, and M. J. Hattier, Cotton Oil co., recorder.

On the program was a question and answer period led by F. Wayne High, Baugh Chemical co. manager of operations, and talks by A. B. Pettit, Davison Chemical co.; Vernon S. Gornto, Smith-Douglass co.; Harold R. Krueger, Snyder Chemical co.; Charles L. McDaniel, Lion Oil co. and A. L. Foster, International Minerals & Chemical corp.

Fert. Safety Section Exec. Group to Meet

When the Executive committee of the Fertilizer section, National Safety Council, meets in Roanoke on June 11, its members will hear Thomas J. Clarke, general chairman, give an estimate of the section's progress as to its organization, national standing and new participants.

"The Big Test" in Film Competition

"The Big Test," a film produced by the National Fertilizer Association, was in the final competition at the 1955 Golden Reel Film Festival held April 4-8 in New York City. NFA's Robert H. Engle, who directed the film, attended the meeting and participated in judging various film classes.

CSMA Offers Test Insecticide Solutions

Now available through the Chemical Specialties Manufacturers Association are official test insecticide solutions for use by manufacturers in determining relative efficiency of their own products. The solutions are used in conjunction with the Peet-Grady test method to rate fly-killing properties of a manufacturer's insecticide against an industry-accepted standard.

CSMA says that all oil-base contact insecticides for household and industrial use are covered by the test method, but it does not apply to cattle sprays having materially higher viscosities than those of fly spray base oils. Official test insecticide cartons consist of six 6-ounce bottles of control solutions, priced at $6.00 per half dozen units. They are available from CSMA, 50 East 41st St., New York City 17.

Materials Handling Show Set for May 16

About 25,000 persons are expected to visit the Sixth National Materials Handling Exposition at Chicago's International Amphitheatre on May 16-20, reports Clapp & Poliak, Inc., producers of the event.

Equipment valued at almost $10 million will be transported to Chicago for the show and exhibited by approximately 250 companies.

ASA-SSSA Meet at Davis

About 375 papers on new developments in crops and soils will be presented at the annual meetings of the American Society of Agronomy and the Soil Science Society of America Aug. 15-19, at Davis, Calif.

CHEMICALS

Nemagon Soil Fumigant Commercially Available

Nemagon, a new soil fumigant, now is available for limited commercial use, according to an announcement by F. W. Hatch, manager of the Agricultural Chemicals div. of Shell Chemical corp.

It already has been tested on a wide variety of crops including cotton, grapes, citrus and other tree crops such as peaches and walnuts. The company reports that some crops appear tolerant enough of the chemical so that applications can be made around roots of the living plant. With established trees, applications of five to 10 gallons per acre have controlled a wide variety of nematodes to a depth of 4 to 6 feet.

Ability of Nemagon to reach such depths is due to its stability in soil, high density and the manner in which it is held to soil particles. In 1955, liquid and dry formulations will be available for limited sales on such crops as citrus, cotton and grapes. Nationwide marketing is expected in 1956.

DDVP Price Established

Montrose Chemical co. has established a price of $3.50 per pound for DDVP (dimethyl dichlorovinyl phosphate) to properly-qualified commercial organizations. Made by Montrose on a pilot-plant scale for experimental purposes, it is being supplied in reasonable quantities to the Government, universities and similar public institutions at no charge, the company reports.

The insecticide was discovered in labs of the US Public Health Service.

Two New DuPont Products

DuPont co. has announced a lawn weed killer that leaves "tracks" to show which dandelions have been sprayed and a new Garden Insect Sprayer—a multi-purpose aerosol insecticide formulation for roses and other outdoor flowers and ornamentals.

Called Lawn Weeder, the herbicide is an aerosol formulation of 2,4-D containing an inert white pigment which lingers on sprayed surfaces long enough for the user to see where he has sprayed.

The new insecticide combination contains methoxychlor, lindane and rotenone, packaged in an aerosol dispenser with finger-tip spray valve.

Dow Markets Baron Herbicide

BARON, a nonselective herbicide which brings a new chemical principle to vegetation control, now is available for industrial use, Dow Chemical has announced. A liquid which emulsifies readily in water, Baron has as its active material 2-(2,4,5-trichlorophenoxy)ethyl 2,2-dichloropropionate, which was discovered as a chemical and developed as an herbicide by Dow research scientists.

The material, which has been given the coined common name erbon, was extensively field tested last year under the code number M-171. Baron contains four pounds of technical erbon per gallon.

Baron may be sprayed on leaves, which take it up directly, or it may be sprayed on the soil, from which it is taken up by roots. Translocation from leaves is relatively independent of rainfall moisture, Dow reports.

When applied to soil, it acts as a residual sterilant, lasting for about a season. Baron applied to foliage exhibits early contact action which produces a prompt reduction of the vegetation and defines the treated area. This is followed by systemic action which effectively kills most plant species to which it is applied. Dow says it has proved to be highly effective against almost all perennial grasses as well as herbaceous plants upon which it has been tested.

Presenting no corrosion problems, Baron is easy to use in conventional weed-control spray equipment, and its animal toxicity is very low. Recommended rates of application range from one to two pints per square rod, corresponding to 100 to 160 lb. erbon equiv per acre.

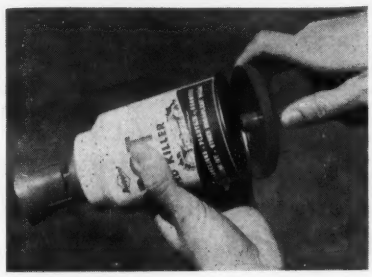
Chemically, erbon is unique among weed killers, says Dow. Other active herbicide chemical molecules, for example 2,4-D, have to be combined with molecules of formulation substances which are more or less inert. Erbon is different. While it, too, consists of a two-part molecule, both parts of the molecule exert herbicidal action, each being toxic to its own range of vegetative types. However, the erbon molecule has proved to be considerably more active than either of its principal components.

Bridgeport Brass Develops 2,4-D Applicator

A new type of 2,4-D applicator has been developed by the Aerasol division of Bridgeport Brass consisting of an inverted aerosol container with an exclusive control cone attached to the end of a cane.

As shown in the accompanying photograph, a container of Bridgeport's Spot Weed Killer is snapped on the detachable 28 inch cane. The plastic control cone is placed over the weed, an operator presses down on the cane and a jet of 2,4-D is injected onto the weed. Vapors are trapped by the cone, says Bridgeport, preventing drift to nearby plants.

One 12 ounce container of weed-killer is said to treat 600 weeds. Suggested retail price for the complete unit is $1.98 with replacement aerosol units at $1.59.



Fla., Va., Registration Granted V-C13 Nematicide

Virginia Carolina Chem. corp has announced registration of its new V-C 13 nematicide for use on turf and ornamentals in Florida and Virginia. Application for registration has been made in other states, and approval is expected soon.

The material, a formulation of 0-2,4-dichlorophenyl 0,0-diethyl phosphorothioate, is applied by mixing in water for drench or injection treatment.

CSC

ANHYDROUS AMMONIA
82.3% N

The most economical and concentrated source of nitrogen available as a plant food. As a fertilizer it is applied directly to the soil and through irrigation. It is widely used by the fertilizer manufacturer for ammoniating superphosphates and as a basic source of N in combined plant-food forms.

AQUA AMMONIA

Convenient form of nitrogen for high-analysis formulations and acid oxidation. Nitrogen content approx. 20% in most widely used grade. Various concentrations available to suit your special need.

NITROGEN SOLUTIONS
CSC 101 – 40.6% N
CSC 102 – 40.8% N
CSC 103 – 37.0% N

Nitrogen solutions provide the lowest cost and most efficient media for quick curing of superphosphates. They supply more total N than any other ammoniating media. CSC Nitrogen Solutions offer the fertilizer manufacturer a wide range of physical properties to meet all requirements.

CSC AMMONIUM NITRATE FERTILIZER 33.5% N

New, crystalline form made by CSC's exclusive process. New process assures low moisture, free flow, and excellent handling and storage characteristics. CSC Ammonium Nitrate Fertilizer is going to the farmer through leading fertilizer manufacturers.

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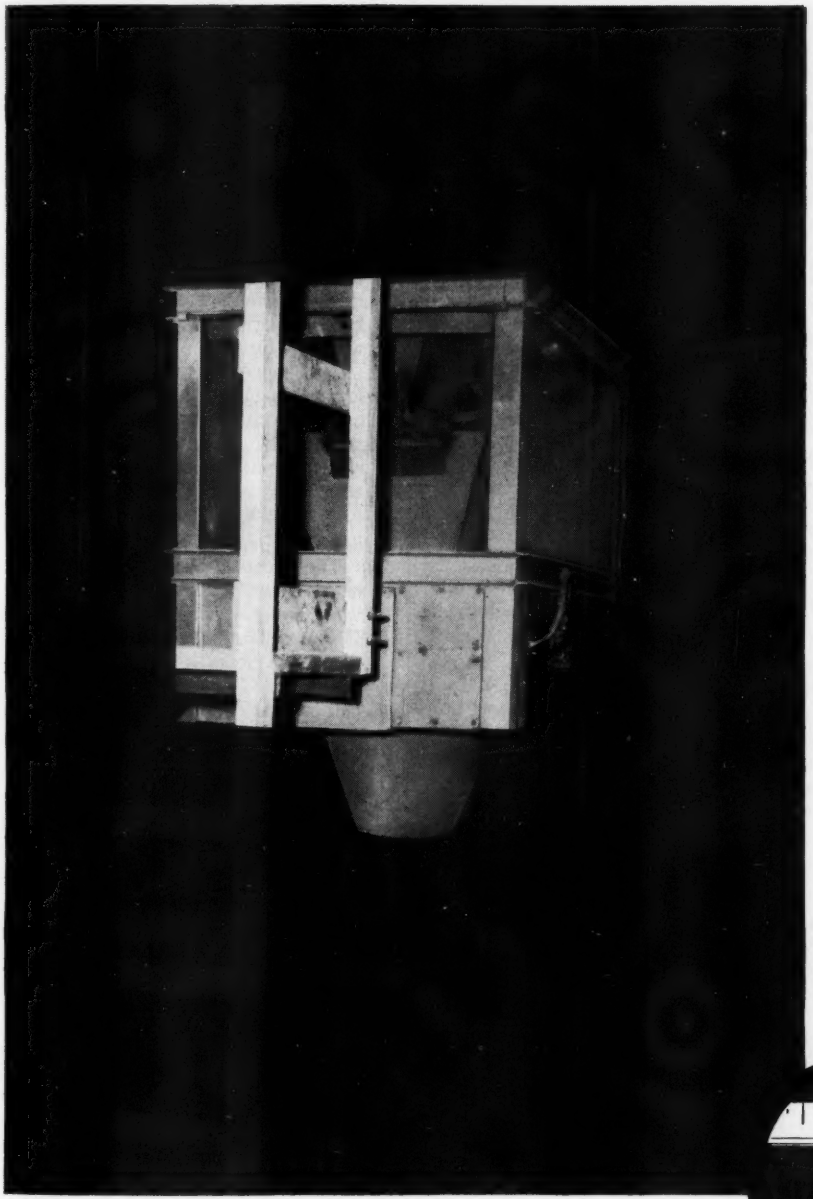
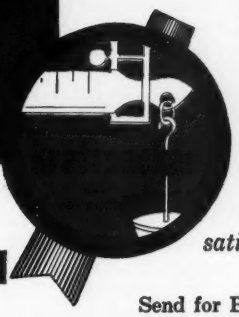


Kraft Bag Corporation the most completely integrated manufacturer of multiwall bags in the industry, is now marketing The **Kraftpacker,** an automatic open mouth bag filling machine that increases production and reduces packaging costs at an almost unbelievable rate.

The **Kraftpacker** maintains accuracy to within a few ounces, plus or minus, even at speeds up to 24-100 lb. bags a minute—*with one operator!*

Costing little money to buy, requiring little maintenance for steady operation, the **Kraftpacker** is a proved money-saver in every way... affording still greater economies for those who convert from valve bags.

There's a machine in operation near you. We shall be glad to arrange for you to see it.



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Chemistry of the Soil. edited by F. E. Bear. ACS Monograph No. 126. $8.75

A complete interpretation of chemical processes involved in soil development written by 14 outstanding scientists. Fully covered are chemical composition of soils, nature of soil colloids, organic matter relationships, oxidation-reduction phenomena, problems of acid, alkaline and saline soils and plant nutrition. A special chapter is included on trace element chemistry and the intimate relationships between plant roots and the soils in which they grow.

Applied Entomology, 5th Ed. Fernald & Shepard. $7.00

New revision deals not only with insect control but also provides an introduction to insect classification and other phases of general entomology. Chapters on insecticides have been completely revised, new information is included on biology and distribution of particular insects and insect physiology is given increased emphasis.

Soil Fertility, C. E. Millar $6.75

Treats all aspects of soil fertility with emphasis on the plant itself. Has full information on all major plant foods and the important trace elements. Problems of saline and southern soils are considered at length and regional cropping systems are discussed.

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Completely revised with new material and many modifications covering the recent important advances in production and use of fertilizers.

Manual on Fertilizer Manufacture, 2nd edition. Dr. V. Sauchelli. $4.50

Prepared especially for those engaged in fertilizer production, completely rewritten with new data on mixed fertilizers, granulation and ammoniation.

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A new book by 14 authorities designed to acquaint home gardeners with plant food deficiencies. Color plates aid in identification of deficiency symptoms.

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'Slow Down' Chemicals Studied by USDA

Chemicals that inhibit the normal development of insects are now being studied by USDA scientists. Unlike most insecticides which are almost immediately deadly to insects, these "slow-down" chemicals inhibit insect growth in various ways; for example, colchicine and aminopterin prevent cell division and growth; sulfanilamide and coumarin slow down an insect's metabolism.

Preliminary investigations at the Beltsville station indicate that there is a great number of these growth-inhibiting chemicals, of which piperonyl butoxide, a non-toxic compound, appears to be one of the most promising.

This chemical, normally added to other insecticides to boost their effectiveness, has been found to slow down the rate of house fly larvae development. Blended with a bran-yeast medium, in which fly larvae are reared in the laboratory, piperonyl butoxide caused the larvae-to-adult development period to be lengthened by two days. When the amount of piperonyl butoxide was slightly more than doubled (to an amount equal to 0.25 per cent of the total weight of the rearing medium), practically no flies reached adulthood.

The scientists also reported that use of piperonyl butoxide in this manner was more effective against the larvae of DDT-resistant flies than against those of normal flies. In one of their experiments, only 3 per cent of the resistant flies became adults, while 16 per cent of the normal flies survived.

Methyl Parathion (RS200)

Commercial quantities of methyl parathion now are available from Monsanto Chemical co.'s Organic Chemicals div. Said to be effective in controlling the various species of aphids and mites when properly formulated and applied as either a liquid or dust, the compound also is reported to be of value for boll weevil control.

Samples and information on methyl parathion may be obtained by circling 200 on the Reader Service card.

Perma Green (RS201)

A new organic iron chelate, Perma Green Iron 135 is being produced by Refined Products corp. It can be added to solid or liquid fertilizers or used in spray form.

For detailed information on this chelate circle 201 on Reader Service card.

AP & C Introduces Bromotox Fumigant

A mixture of ethylene dibromide and methyl bromide, named Bromotox, recently was introduced by American Potash and Chemical corp.

An example of the effectiveness of the product, the company says, was shown by 48-hour fumigating tests in which equal applications were made of ethylene dibromide, methyl bromide and "Bromotox," each applied in separate tests. Pest mortality for ethylene dibromide was about 72 per cent, for methyl bromide about 65 per cent, while "Bromotox" resulted in 100 per cent kill, AP & C reports.

Catechol for Treating Seed Potato Pieces

Working with material supplied by Koppers co., Colorado A&M College scientists have developed a process for treating seed potato pieces with catechol to make them more resistant to soil fungus attack and storage decay.

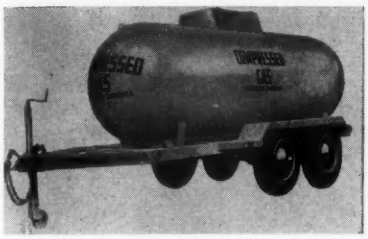
Application can be made with dust (about 0.5 per cent catechol in talc) or a liquid dip (0.15 per cent catechol in water).

Equipment & Supplies

Tank Trailer for Anhydrous NH_3 Transport (RS202)

Foreman Mfg. co. has just announced a new tank trailer designed primarily for transporting anhydrous ammonia. The unit is designed to insure compliance with applicable ICC regulations, with a tank mounting which facilitates tank removal.

Unique and versatile feature of the tank trailer, says Foreman, is that upon removal of the tank, the trailer itself



may be used for a variety of hauling jobs. The current model has been designed to carry either a 41 inch or 46 inch 1,000-gallon tank. A trailer to carry a 500-gallon tank will soon be available.

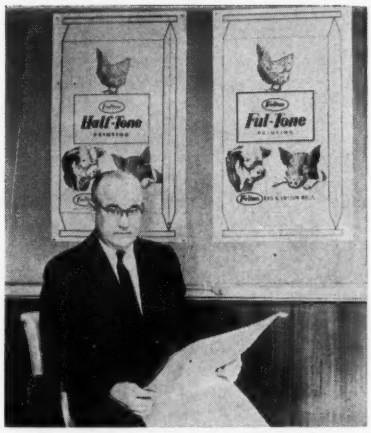
For complete details and literature, circle 202 on the Reader Service card.

Larvacovers by Larvacide

A vinyl plastic soil cover, named Larvacovers, for use in chemical and steam sterilization has been announced by Larvacide Products, Inc. Life expectancy of the new type cover is increased significantly by a florist green tint coloring which increases resistance to deterioration from sunlight and through the use of heavy duty, 8 gauge plastic film, the company states.

Although Larvacovers are manufactured specifically for use in chemical and steam soil treatment, they may also be used in irrigation ditch lining, water conservation, erosion prevention and in temporary greenhouse construction.

Ful-Tone Printing (RS203)



J. Frank Greeley, Fulton Bag & Cotton Mills director of multiwall sales, examines samples of new Ful-Tone printing, which, Fulton says, permits reproduction of more natural, life-like pictures than was possible using older printing methods. Brighter printing ink colors are used, with no increased cost to the buyer. For information and samples of Ful-Tone and Half-Tone printing, circle 203 on Reader Service card.

D-K Rotary Mixer (RS204)

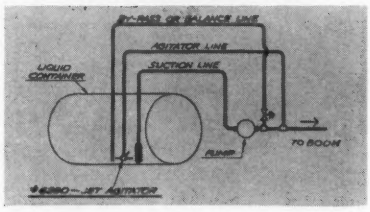
Davison-Kennedy co. is now marketing a large capacity rotary blending type mixer for dry or semi-wet materials. Blending in minimum time is accomplished through an arrangement of special steel alloy mixer flights, and the mixer features a sealed mixing unit with self take up seal on the inlet.

It is available in 37, 59, and 69 cu. ft. mixing capacities.

For more information circle 204 on the Reader Service card.

Agitator Nozzle (RS205)

To maintain a proper mix during spraying operations, Spraying Systems co. has designed the No. 6290 Jet Agitator Nozzle, which is positioned near the bottom of the drum. Liquid



Schematic view of typical installation of agitator nozzle in drum.

is sprayed in three directions, creating a random agitation pattern that continuously maintains an equalized distribution of chemicals.

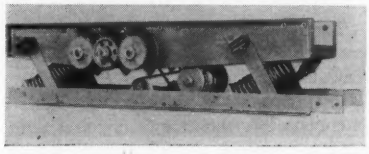
The manufacturer says that the nozzle has been proved effective in field tests with a variety of solutions. They are supplied in a choice of all brass, brass with stainless steel caps and in all aluminum.

For a data sheet giving complete information, circle 205 on the Reader Service card.

G-W Oscilveyor (RS206)

Practically no maintenance is required to run Gifford-Wood co.'s new oscillating conveyor, designed with a minimum of moving parts, according to G-W officials.

The Oscilveyor is a vibrating trough driven by rotating eccentric weights. Its components are a drive unit, a



trough resting on rocker arms and coiled springs and a supporting base frame. The base frame and saddle are of standard construction, and any desired type of trough or tube may be set on the supporting base frame.

For more information, circle 206 on the Reader Service card.

New Panogen Adapter for Changing to Slurry Mixture

Now available from Panogen, Inc., is a slurry adapter which permits a quick change-over from the liquid method of treating wheat and other grains to use of slurry, or a semi-solid mixture.

The slurry unit employs a unique overflow feature to get uniform continous suspension of the chemical used, a measuring device to maintain an exact dosage rate for the seed and a pump which completely empties the tank, according to Panogen. A self-cleaning feature allows quick change from slurry back to liquid.

Rockwell Service Truck

To provide contract field lubrication service on a national scale, Rockwell Mfg. co's Meter and Valve div. has a fleet of specially constructed trucks. Carrying complete field stocks of valve lubricants, lubrication fittings, lubricant pumping equipment and spare parts, trucks also are equipped with tool benches.

Lagz Coating (RS207)

A new protective coating for thermal insulation, "Lagz" has been developed by West Chester Chemical co. Compounded from Neoprene and silicone rubbers and other resins, the coating is unaffected by moisture, oils, brine, solvents, corrosive gases, chemicals and weathering, according to the manufacturer, and is non-flammable and non-toxic.

For literature and a sample, formulators can circle 207 on the Reader Service card.

Phenoline Coating (RS208)

Three modifications of Phenoline 300 protective coating have been made by Carboline co.

Phenoline Series coatings are modified phenolics, thermosetting at room temperature, for use as tank linings, severe maintenance painting and floor coverings in acid, alkali and solvent environments. Modifications 302-305 and 305 with a new phenoline 301 prime coat and phenoline 303 intermediate coat were developed, reports Carboline, to give more specialized recommendations for solving specific problems.

Detailed information on the series is contained in a bulletin which explains Carboline's testing programs, areas where coatings are recommended, a chart showing primers required, number of coats, temperatures of use, surfaces on which used, coverage and thicknesses recommended.

For a copy, circle 208 on the Reader Service card.

Suppliers' News

Morse

Bemis Bro. Bag co. changes in managerial personnel:

Everett I. Morse, central paper buyer in Boston, has been named director of paper procurement, a new title created in recognition of the increased importance and scope of paper procurement in Bemis operations.

Linville

L. A. Linville has taken up duties as assistant director of sales, replacing C. W. Akin, who is temporarily assigned to plastic bag development.

In 1930 Linville started his career with the bag industry as a salesman with the Jaite co. at St. Helens, Ore. He was made manager in 1934 and retained that position when Bemis purchased the plant in 1941.

Williams

Succeeding Linville as manager of the company's multiwall paper bag plant at Vancouver, Wash., is A. B. Williams, formerly sales manager there.

Chain Belt co. has purchased 47 acres near Downers Grove, Ill., for expansion of its Shafer Bearing div. manufacturing facilities. Now located at 801 Burlington Ave. in Downers Grove, the division was acquired by Chain Belt in 1953.

Opening of a new office in the Midland Bldg., Cleveland, and relocation of its Chicago office in the Merchandise Mart has been announced by **Dorr-Oliver, Inc.** Staff formerly located in both Chicago and Evanston will be housed in the new Chicago office, which will serve as headquarters of the Central Sanitary div. and Central Industrial div. R. R. Denison, Central Industrial sales engineer, and J. N. McKenna of the Central Sanitary div., will staff the Cleveland office.

Madison

Emil A. Madison has been named sales manager of the **E. S. Gandrud co.**, manufacturers of Gandy fertilizer spreaders and seeders.

Formerly manager of Pacific Supply co.'s Machinery div., Madison will direct an expanded sales drive sparked by addition of four new spreader-seeders to the company's line.

A new branch sales office has been opened by **International Paper co.** at Room 908, Equitable Bldg., 17th and Stout Sts., Denver, Colo. Russell A. Gair, Jr., already located in Denver, will continue to represent Bagpak div., Bryan J. Smith will represent the Container div. and Edwin B. Williams, the Single Service div.

St. Regis Paper co. has reached an agreement with L. S. Pollock, president, to acquire through an exchange of stock the Pollock Paper corp., Dallas, Tex. St. Regis President R. J. Ferguson said the Pollock organization would remain unchanged and management would continue as in the past with the present officers.

St. Regis Paper has awarded its Fellowship in Forestry to Thomas W. Beers, a senior at the School of Forestry, Pennsylvania State University.

Simplicity Engineering co. has announced a new Canadian subsidiary, Simplicity Materials Handling Ltd., Guelph, Ont. The firm with E. L. A. Whitaker as general manager, will sell, install and service Simplicity equipment and maintain a full stock of replacement parts.

An $18 million expansion program is planned by **Union Bag & Paper corp.** during the next five or six years at its Savannah, Ga., mill, according to the company's annual report.

Hordych

Union Bag and Paper corp. has announced appointment of John Hordych as manager of its Packaging Services dept. Hordych joined the Union organization in 1948 and has been with the Packaging Services dept. since that time.

For information on numbered items use the Reader Service Card

Meet The Demand For High Analysis
Use
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TRIPLE
Superphosphate
State Agricultural Experiment Stations and other authoritative sources are recommending fertilizers with ever increasing plant food units per ton. High analysis fertilizers are in demand because they give more for each fertilizer dollar. Meet this demand by incorporating Davison's New Triple Superphosphate in your formulation.
Davison's Triple Superphosphate has 45/46% available P_2O_5 and is supplied in the easy-to-use granulated form or run-of-pile.
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PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, TRIPLE SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS AND SILICOFLUORIDES. SOLE PRODUCERS OF DAVCO® GRANULATED FERTILIZERS.

Cellu-San, a zinc petroleum sulfonate product, is shown to be an effective and practical preservative-fungicide for protection from moisture and fungi.

Preservative for Harvesting Containers

By Milton Goll
Manager, Commercial Development, Fungicides, Nuodex Products company, Inc., Elizabeth, N. J.

and

Chester D. Thompson
Director of Research, Darworth Incorporated, Simsbury, Conn.

IN RECENT years there has been an ever increasing demand by food growers and packers for a method of preserving and protecting agricultural canvas and wood such as the surfaces of viner aprons, hampers and field boxes from deterioration caused by fungus (molds and mildew) and moisture. The economic benefit to be derived from the use of proper preservatives on surfaces coming in contact with food has become of greater economic value with the increased cost of labor and materials. Additional advantage from the treatment is the increased cleanliness of the treated surfaces when in use.

Treatment Requisites

The requisites for any satisfactory treatment of wood carriers and containers used for foodstuffs are that it be non-toxic to humans and without lasting odor or taste. During harvesting operations especially, it is important to prevent spoilage due to contaminant odor or taste absorption or damage caused by the loosening of nails or other fasteners.

A treatment should:

1. Protect wood against fungi which cause decay, mildew or unsanitary conditions. (Dry rot attack, usually responsible for brittleness and lack of resiliency, may be overcome by a fungistatic treatment, thereby increasing the service life of the treated wood.)

2. Check dimensional changes in wood by reducing fluctuations in its moisture content. (Wood that dries out may check, split or warp, thus reducing its serviceability. It may also shrink away from nails, exposing them as dangers to materials and merchandise. Minimizing repair and maintenance expenses of these kinds proves highly beneficial and economical.)

3. Render to wood no appreciable color, odor nor toxic properties which, if absorbed, would adversely affect stored goods.

4. Be easily handled, applied and non-toxic to a person in direct contact with it.

5. Be long lasting and withstand constantly humid conditions and other weathering effects.

With these fundamental objectives as a guide, a research program was established that led to the development of a new wood treatment specifically geared to improve the innate advantages of wooden field boxes and hampers.

A thorough evaluation of many known or suspected fungicides eliminated all but a few petroleum sulfonate salt compounds.

Experiments with fungal activity on wood have shown that losses in tensile strength reflect other changes, too. Flexural stability is invariably lost, so that if a piece of wood is bent, it will readily snap in two. The Hopkins-Coldwell technique was used to get a preliminary measure of the fungicidal effectiveness of the compounds. Permanence of the treatment was determined by leaching some of the test specimens at the rate of 8 liters of water per hour for 24 hours. All strips (yellow birch veneer) were buried in moist earth for 28 days, then tested for residual tensile strengths.

Effects of Cellu-San

The results of these tests indicated that a composition of zinc petroleum sulfonate,* designated and trademarked as Cellu-San, showed the greatest promise for an effective, practical preservative-fungicide. Excellent decay resistance was imparted to wood treated with this new compound. For commercial application, a 5 per cent active content solution proved adequate.

The highly accelerated Leutritz soil wood-block method provided further proof of the decay resistance of Cellu-San treated wood. Southern yellow pine sapwood blocks were prepared retaining a petroleum sulfonate treating solution concentration of two pounds per cubic foot and others retaining one pound per cubic foot. The treated samples lost almost no weight when exposed to the test organisms, Lenzites trabea and Poria microspora. In vivid contrast, untreated controls lost as much as one-half their original weight under the same conditions.

Trichoderma Test

The fungus Trichoderma, which is often found on wood and wood products, was used to determine the protection afforded against surface mold and mildew. Yellow birch veneers were dipped in a

*Patented

dilution of one part Cellu-San and two parts mineral spirits. When dry, they were placed on a 48-hour culture of the organism growing on malt agar in a Petri dish. The veneers themselves were inoculated with the fungus and placed in incubation. At the end of seven days, the untreated samples were overrun with mold while the treated specimens completely resisted fungal attack.

Further checks on decay and mildew resistance were made by treating squares of yellow veneer birch with the commercial 5 per cent solution and exposing them in a cycled "tropical" chamber where optimum conditions for decay and mildew were maintained. Relative humidity was kept at 95–100 per cent. Temperature was cycled between 20 and 30 degrees C., exceeding 25 degrees C. for about 18 hours of the day. The high humidity and cycled temperature result in moisture condensation which affects optimum conditions for microbial development.

Some specimens were leached and others were weathered for one month on a rooftop in Elizabeth, N. J. Replicates as is, leached and weathered, were then put into the test.

The results of the Trichoderma test and the tropical chamber exposure indicate the high degree of effectiveness of the petroleum sulfonate composition against mildew and decay-producing organisms. Where wood is already contaminated, this formulation will inactivate the fungi, thus minimizing contamination of materials coming in contact with the wood at a later date.

In controlling dimensional stability, fluctuations in moisture content of wood are vital factors. It was necessary, therefore, to test the moisture repellency of the new composition. A standard 1:2 solution was used to treat blocks of yellow pine sapwood measuring 2-3/8 x 3-7/8 x 11/16 inches. Some blocks were leached with water for 24 hours at a rate of 39 liters per hour. Others were weathered for one month on a rooftop. All blocks were weighed, then immersed in water for varying periods of time. Upon removal, they were wiped dry and reweighed. The results showed that the Cellu-San composition imparted considerable water repellency as shown herewith in Table 1.

When a preservative is used on containers for handling fruits, vegetables, sugar, flour, etc., which are prone to absorb foreign odors, it must, obviously, possess no odor of its own. In determining the odor characteristics of the new microbicide, a number of yellow pine sapwood blocks were treated with the standard solution. Other blocks were treated with mineral spirits alone. Both the treated and the control blocks were given a 24-hour air-drying period, then sealed individually in quart jars. Seventy-two hours later tests were conducted which indicated that Cellu-San imparts no odor to wood. It is, therefore, safe to use on wood which comes in contact with any odor-absorbing materials.

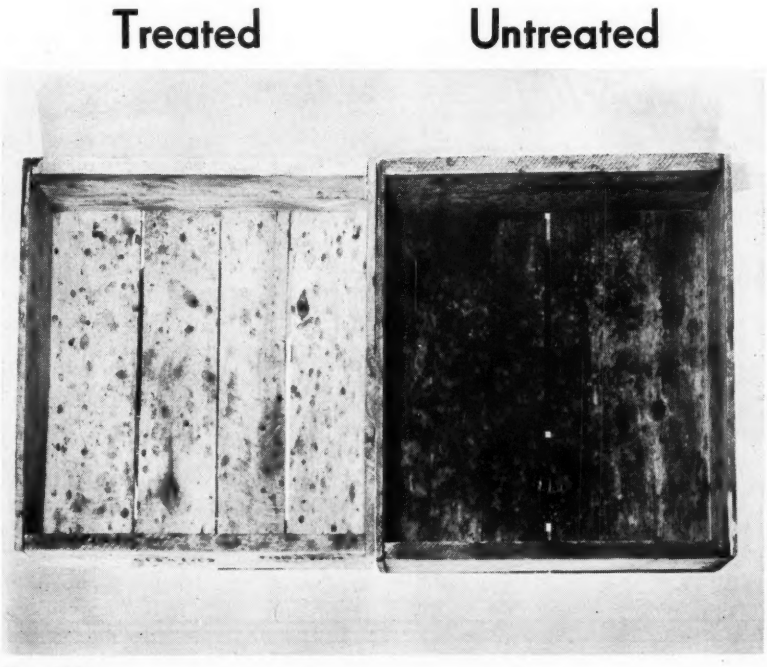
Rough Handling Tests

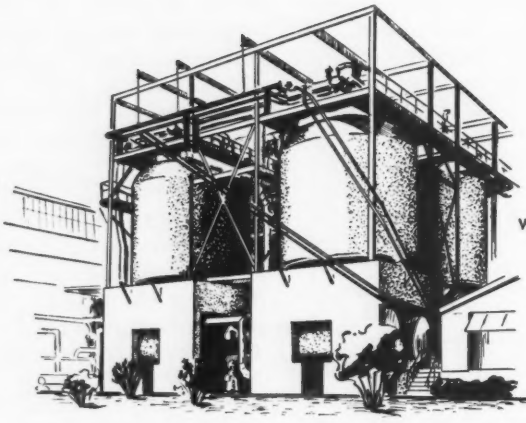
To ascertain the applicability of the new preservative to wooden articles which sustain rough handling when in use, tests were made to determine the performance characteristics of both treated and untreated wooden articles. An equal number of wooden field boxes was chosen at random from a group which had been used for one complete harvesting season at the Bridgeton, N. J., plant of Seabrook Farms, frozen food growers and processors. The boxes were submitted to an independent laboratory (Packaging Service corp., Wyncote, Pa.).

Empty boxes were tested on a vibrator table with a mixed motion, a "pitch and toss" as well as horizontal and vertical vibration. To simulate rail or truck transportation, a "fence" on the table repeatedly bumps the boxes. One hour of this treatment is equivalent to about two weeks (336 hours) actual transportation. Results showed that untreated wood did not retain nails nearly as well as treated wood. The ratio of nail failures in the untreated group exceeded failures in the treated group by 174 per cent.

Next, the boxes were filled with 60 pound dummy loads and subjected to drop tests simulating the handling hazards of regular usage. Four two foot drops were made for each box—one flatwise on the bottom, one on the long edge, one on the medium edge and finally on the short edge. Sixty per cent of the untreated boxes required repair or recoopering before they could be returned to service. All

After a season of use . . .





Water Treating Plant

Crude Sulphur

for Industrial Use

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75 East 45th Street • New York 17, N. Y.

Producing Units

- **NEWGULF, TEXAS**
- **MOSS BLUFF, TEXAS**
- **SPINDLETOP, TEXAS**
- **WORLAND, WYOMING**

Table 1. Water Repellency

	% increase in weight due to water pick-up after immersion of				
	15 Min.	30 Min.	60 Min.	120 Min.	240 Min.
Unleached blocks					
Treated.....	2.2	4.6	5.5	7.2	9.5
Untreated.....	18.7	22.5	26.9	31.4	35.4
Leached blocks					
Treated.....	3.6	3.8	4.8	6.6	9.1
Untreated.....	22.8	27.4	32.5	37.0	40.8
Weathered blocks					
Treated.....	3.2	5.0	5.6	7.3	9.5
Untreated.....	20.6	24.1	27.8	32.4	34.9

but one of the treated boxes were returned to service without repairs. The one damaged box required very slight recoopering. In this test, the containers failed through loosening of nails at joints or splitting of panels.

After damages were repaired, all of the boxes were again filled with the 60 pound dummy load and placed for one hour on the vibrator table. The table operated at 200 RPM with one inch strokes to produce an impact of one "G". The results were similar to those of the previous tests. Sixty per cent of the untreated boxes were damaged, while 20 per cent of the treated containers showed only slight loosening of the nails. In this test, designed to simulate several weeks of truck transportation, the nail failures in the untreated group exceeded those in the treated group by 1,105 per cent.

Next, the containers were emptied and given 25 falls, "gang run," in a 14 foot drum rotating at 1 RPM. The revolving-drum testing machine combines in a single test all the hazards encountered by containers in service . . . slides, falls, strikes on all sides, edges and corners that simulate the stresses, shock and rough handling of actual use. Since the drum rotates slowly, it is possible to observe failures as they begin and follow their progress until the containers become unserviceable. After 25 falls, 60 per cent of the untreated boxes showed complete failure and had to be removed from the drum. The remaining untreated boxes all required slight recoopering before being put back in service. At this point it was apparent that these containers were becoming very tired—nails loosening, wood splitting, etc. The treated boxes, on the other hand, after 25 falls were still 80 per cent serviceable. The remaining 20 per cent, with slight recoopering, could still be returned to service.

In its report, the independent laboratory which conducted the tests stated that the treated boxes withstood fatigue to a much greater degree, were far more efficient mechanical-wise than the untreated boxes and that a much longer service life could be expected from a treated container.

Since it was important that this water-repellent fungicide be nontoxic to mammals, another independent laboratory was employed to perform a series of ingestion tests in which rabbits were fed extremely large quantities of Cellu-San. No ill effects were suffered by any of the test animals.

Dermatitis Appraisal

Practical considerations also required that this compound be nonirritating to anyone applying it or handling treated wood. The dermatitis appraisal, performed in accordance with Navy Specification 51–D–6 by an independent laboratory, indicated that it is completely safe in these respects. Confirmation of this report is evidenced by actual field testing for more than a year.

The National Wooden Box Association has given Cellu-San its highest approval rating. Laboratory tests and field performance reports uphold its fast-growing reputation as an outstanding wood preservative and fungicide. It is suitable for the treatment of any wooden containers used in the handling or warehousing of odor and mildew-sensitive materials, especially in industries where mildew and decay-producing micro-organisms are prevalent. ◆

Try an employee

tractor contest

CONTESTS are always an excellent means of stimulating employee interest. Perhaps the most used are in connection with safety drives in which operating units are pitted against each other in competition for awards based on the lowest accident and lost time rates.

Kingsbury & company operated a different type of contest, one which aroused considerable enthusiasm among employees at the firm's Indianapolis, Ind., fertilizer plant. This was basically a tractor driving contest, but it also involved lift trucks and wheelbarrows.

M. H. Talbott, superintendent of the plant, described this event at the Chicago Fertilizer Section, National Safety Council meetings in Chicago last fall, and he has provided FARM CHEMICALS with some additional information and a schematic diagram for the benefit of others who might like to develop a similar form of employee participation contest.

It's no secret that fertilizer plants come in a wide variety of sizes, shapes and styles, but the basic layout, as shown in the accompanying diagram, can be adapted to most facilities.

Obstacle Course

The basic element of the layout for the Kingsbury contest was an obstacle course of eight barrels set up in a line outside the plant building. This, says Talbott, permitted close observation of driver skill from the nearby loading platform and enabled judges to spot an operator's ability to get in and out of tight places.

In the tractor shovel competition, operators mounted the tractor at a warehouse, drove in and out of the obstacle course, entered a bin, picked up a load of fertilizer, returned to the warehouse by again negotiating the barrels, backed through the obstacles to a second bin, replaced the fertilizer and went around the barrels a fourth time, parking the tractor at the warehouse.

On each trip, the route passed over a rough railroad crossing. Contestants were judged on the load carried, best driving and elapsed time. Fertilizer spilled counted against the driver as did contact with a barrel.

Lift Truck Competition

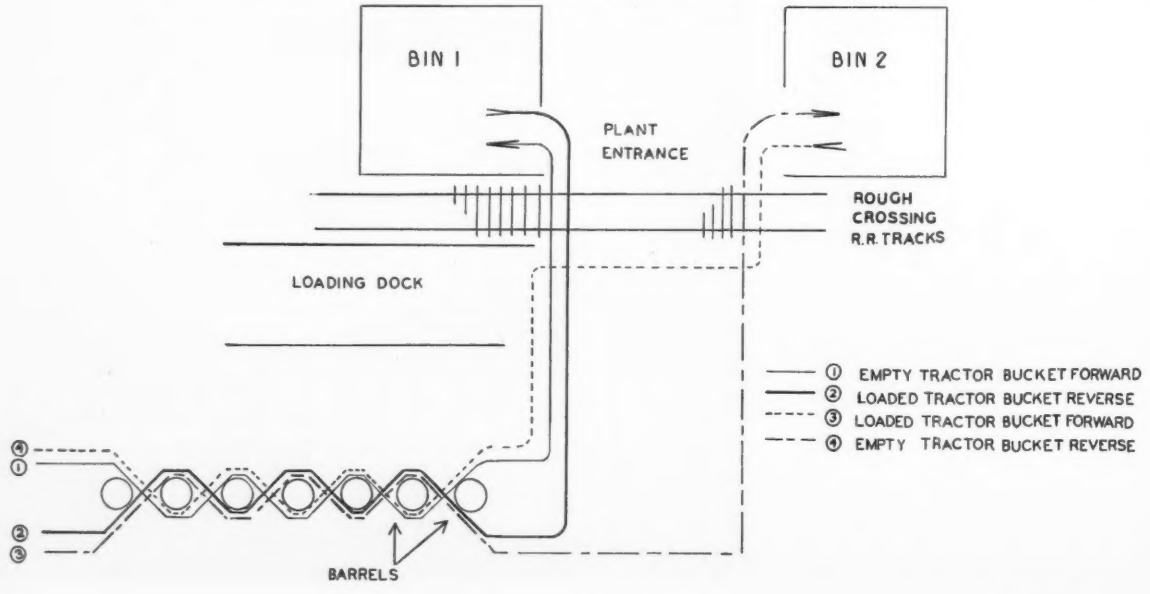
Lift truck operators drove first to one end of the warehouse where two stacks of bagged goods were piled, picked up one stack, drove to the opposite end of the warehouse and placed the load as close as possible to a third stack located at that point. Backing up, they picked up the third stack, carried it to the opposite end, placed it next to the stack remaining at that location and returned to the opposite end of the warehouse.

Talbott pointed out that pallets are not used with the lift trucks in the Indianapolis plant; the Hyster units are equipped with a squeeze clamp arrangement that picks up bags right from the floor.

In scoring, bags closest together counted for the contestants along with best driving and elapsed time and the most careful bag handling. A driver spilling a load of bags was required to dismount and restack the packages.

With the wheelbarrows, contestants started at one end of the warehouse, figured their best route to a specified precip. bin, picked up a 150 pound load, went to the batch weigh scales and weighed the material, returned along the loading dock to the warehouse, replaced the material in the bin and returned to the starting position. Best time won with spilled material counting against the operator. ◆

Layout and operation of the Kingsbury tractor shovel contest.



"The hands unload them rough"

—says Fred Schroer, Jr. of Valdosta, Ga.

"I've never seen a thread give under this pounding and believe me, if they weren't tough burlap bags, we'd have a heavy loss over the years from waste."

Fred should know. He and his brother, Herbert, now run the 1200-acre farm of their father, Fred W. Schroer, retired Master Farmer and pioneer in the modern agricultural age of South Georgia. Mr. Schroer says he's been using burlap bags since 1912 and, "During the years, I've had less trouble with burlap bags than any one thing I use. First thing I did this year was put in our fertilizer order—in burlap bags, of course. You can't beat them—no matter how you try or what you use."

That's a strong statement from such an outstanding farmer, but typical of what farmers all over the country tell us. Burlap bags are *preferred* by farmers.

Just ask your own customers—

they'll tell you that burlap

Is strong — takes dragging, dropping, *man-handling* — any tough job on the farm.

Gives good ventilation — keeps farm supplies and products fresh.

Laughs at sudden showers — wetness or dampness can't weaken it.

Saves money — extra value from re-sale and re-use.

Saves storage space — stacks to any height without slipping.

Has 1000 uses — always in demand on the farm (popular with farm wives, too!)

THE BURLAP COUNCIL

of the Indian Jute Mills Association

155 East 44th Street, New York 17, N. Y.

Archer Smith's Fertil-Ade Plan

Smith expands tie-ins with fuel oil distributors, cites over 400 participants last year. Insecticide and weed-killer sprays added to 1955 service program.

THIS year, for the first time, fuel oil distributors will be offering the home owner a complete lawn care service including liquid fertilization, insect and weed control through a plan developed by Archer Smith, Smith Equipment and Supply co., Chicago, Ill.

Last year, Smith originated the oil truck method of distributing and applying liquid fertilizer with over 400 fuel oil distributors participating in the plan. These companies, troubled with off-season down time on equipment and faced with the necessity of personnel lay-offs during the slack spring and summer season, were quick to adopt a means of keeping both trucks and drivers on the job during that time of the year.

Those who entered the plant food field, says Smith, made unexpectedly high profits, up to $110 a day and over per truck, when they went after business in an aggressive manner. In addition to creating a new source of revenue, most participants in the lawn care program reported increased fuel oil sales through the expanded consumer relations.

Smith Plans Expansion

This year, the Smith company is preparing to greatly expand this phase of its operations, and many new dealers are expected to add the lawn service, attracted by profit records set during 1954.

The addition of weed and insect controls for the 1955 season, Smith points out, substantially increases profit potentials.

The newly available sprays as described are highly

effective in combatting weeds and crab grass and in controlling plant and soil insects. Like the Smith fertilizer, Fertil-Ade, they are applied through pressure spraying carried out by the truck driver.

Smith's Fertil-Ade liquid fertilizer has a 10–8–6 formula and has been used successfully for several years by golf courses, green-houses and nurseries.

How The Plan Works

Briefly, this is how the plan works:

A fuel oil dealer can apply to the Smith company for a Fertil-Ade contract and, when granted, he is authorized to paint his trucks in the approved green-and-white color scheme and to advertise the Fertil-Ade name. The concentrate is purchased in 55 gallon drums or by truck or carload and diluted in the trucks according to a specified formula. Trucks are equipped with a moderately priced spraying device.

Mailing pieces and circulars are supplied by the Smith company for door-to-door distribution and dealers are also provided with complete selling instructions and schedules for timing sales approaches.

Six applications of fertilizer are recommended over the grass growing season from April through September, a recommendation that sometimes leads to sales resistance since many people feel that spring and fall feedings are sufficient.

A typical program calls for plant food application monthly from April to September. In May, a soil insect killer is also applied; in June, a combination of broad-leaf weed killer and crab grass killer is used followed in three weeks by an application of crab grass killer only; in July, Fertil-Ade is combined with a plant insect control and, if warranted, this combination is repeated in August.

The insecticide is aimed at control of white grubs, ants, cut and wire worms, chinch bugs, Japanese beetles and sod web worms. According to Smith the material is harmless to angle worms.

Converting Fuel Trucks

Costs of converting fuel oil trucks to fertilization operations is modest, according to Smith. Each compartment is first flushed out with a synthetic detergent and water solution; then the tank is steam-cleaned inside and out.

Standard 1¼-inch fuel oil hose is replaced with a ¾-inch water hose with bursting strength sufficient for the pump used. For most operators a two braid, high quality hose about 250 feet in length has proved successful.

Smith has designed a special spray gun that is being used by most of the fuel oil jobbers now applying plant foods. The unit provides a 40-foot swath with 40 lbs. nozzle pressure.

The recommended pump is a centrifugal type capable of 150 psi. Fuel oil meters are removed and replaced with tubing to complete the renovation.

For applying the herbicide, Smith has another specially designed piece of equipment which he claims permits spraying even on windy days. This "spray-mobile" covers a four foot swath. ◆

For faster, more accurate blending of dry ingredients...

...make it a

UNEQUALLED FOR DRY MIXING OF:
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• FERTILIZERS • GLUE • CEREALS
• GELATIN • OTHER DRY INGREDIENTS

You can mix it better and faster in a Munson ... the Rotary Batch Mixer with the **tumbling action** for intimate blending of dry ingredients.

Its famous 7-way mixing action assures extreme accuracy of blend, without grinding or reducing size of ingredient particles.

Munson Rotary Batch Mixers are available in capacities from 20 to 250 cu. ft. The basic Munson design can be altered to fit **your** individual requirements. Can be fitted with internal spray for introduction of limited amount of liquid.

Lower horsepower requirements and low operating costs have made Munson the **first choice** for performance and economy in hundreds of different applications. Let our engineers help solve **your** mixing problems.

Other famous MUNSON products: Rotary Knife Cutters, Hammer Mills (25 to 100 H.P.), Attrition Mills (24″ to 30″), Rotary Crushers.

NO OTHER MIXER HAS THIS MULTIPLE-BLENDING ACTION!

Lifters on inside of truncated cone ends continuously cut out and lift ingredients as drum slowly revolves. Rotating cone tumbles stock.

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Farm Chemicals

Washington Report

By John Harms

Fertilizer sales, running considerably behind a year ago, show strong signs of winding up 5 per cent to 10 per cent less for the year. Two recent surveys point in this direction, although one is more optimistic than the other.

A spot survey of producers conducted by the National Fertilizer Association indicates tonnage sales through March are running about 5 per cent behind a year ago in southern states, and 10 per cent to 15 per cent behind in the northern states. NFA believes, however, that much of this lost ground will be made up in later spring months. The survey indicates southern sales may be off no more than 2 per cent to 3 per cent for the year as a whole, and northern sales "within 5 per cent" of 1953-54 shipments.

Commerce Department's Survey of Current Business, meanwhile, indicates that national tonnage sales for the first eight months of this year are running about 7 per cent off last year's pace. According to this survey, which is based on state fertilizer tax "tag" reports, sales in January ran even with a year ago in the important southern states. But in February, sales were down more than 25 per cent. Composite sales in January-February were off 20 per cent.

Various factors contributed to the slow start this Spring, including cold wet weather in recent months, last year's drought, rigid production controls and farmer hesitancy to early placing of fertilizer until weather conditions are more stable. Lower farm income also is believed to have a go-slow effect on farm fertilizer purchases.

Market observers believe that fertilizer sales will pick up, but they are almost unanimous in predictions that sales won't be as big as a year ago. While the trend is toward high analysis fertilizer, they believe that sales in terms of plant food also will be down.

Pesticide sales are in for a shot in the arm this year. How big the boost will prove to be is anybody's guess at this point, but it could be considerable.

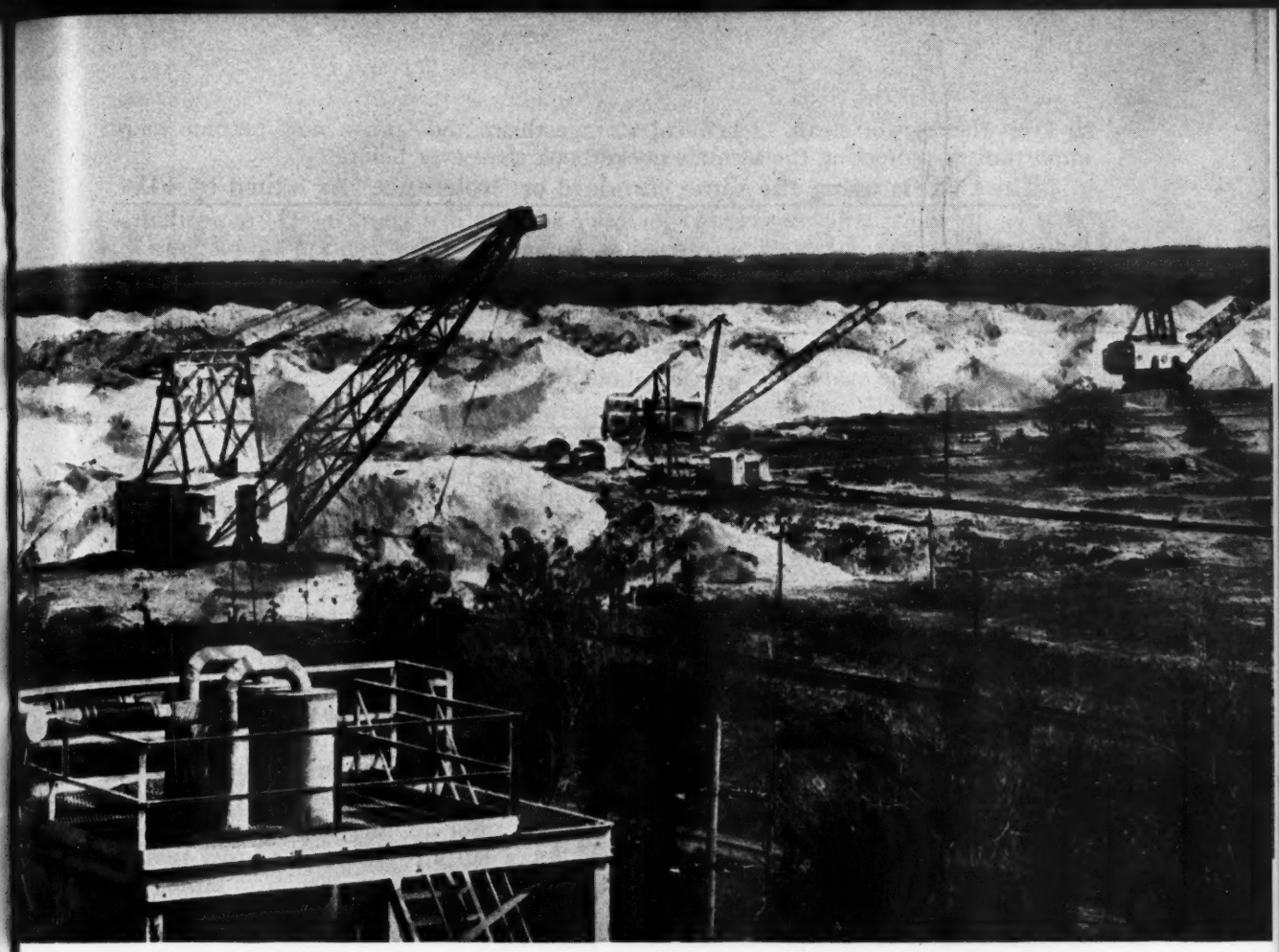
The "clean grain" program of the Food & Drug Administration has moved out to the farm. Starting with the 1955 wheat crop harvested this summer and fall, FDA sanitation standards will be a condition for gaining Government price supports. The Agriculture department's Commodity Credit corp., giant price-propping agency, has announced it will neither buy nor loan money on wheat which does not meet these standards. This applies only to wheat.

The CCC also has imposed the FDA standard on wheat of the 1954 crop which comes under the re-seal program. Under this program the Government pays farmers and other grain storage people so much per bushel to put the remaining 1954 wheat crop under lock and key for another year. Before it can be re-sealed, all 1954 wheat held on farms must meet the FDA test. This does not apply to wheat now being turned over to CCC in forfeiture of last year's Government loans.

Any wheat failing the FDA test will be down-graded as feed wheat, regardless of quality under the US Uniform Grain Standards. Such down-grading could mean considerable financial loss for affected farmers.

Some farmers may even be compelled to make cash settlement with the Government. For example, much 1955 wheat will be handed the CCC as collateral for loans this summer. These loans are redeemable next spring. At that time, CCC will again test the wheat under loan. If it tests out below FDA standards, the farmer may be asked to pay CCC the difference between the loan he received and the current market for feed wheat.

Farmers should be made aware of these possibilities. It will pay them



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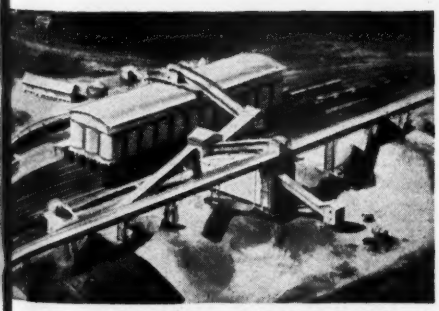

From the air—wet rock storage and drying plant, with dry rock storage silos in background. These silos, 29 in number, have a total capacity of 40,000 tons of dried rock. Under the silos are four runways where 40 railroad cars can be loaded at a time.

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to keep their grain clean. Chemical storage dusts and sprays now become more important in protecting the farmers pocketbook than ever before.

The CCC is using the same standard or "tolerance" as issued by FDA. That is, no wheat will be accepted for price support if it contains (1) more than 2 rodent pellets per pint or a corresponding amount of other contamination, nor (2) more than 2 per cent insect-infested kernels.

Don't miss the significance of the wheat marketing quota referendum this summer. Government officials, farm leaders, congressmen and many small-town businessmen are considerably worried about the possibilities.

More than one million wheat farmers will vote this summer on whether they want to continue with a restricted 55-million-acre allotment to receive 80 per cent or higher price support in 1956, or plant as much wheat as they want with only nominal price protection. If at least ⅔ of those voting prefer to trade substantial price protection for tight production controls, things will go on about as now.

But, and this is a big but, if they defeat quotas and prefer to go it on their own, the effect could have farm-wide, and indeed, nation-wide impact.

It could set off a chain-reaction of lower prices extending throughout agriculture—with much lower wheat prices (and bigger supplies) pulling down feed grain prices, that in turn encouraging expansion in poultry and hog production. It could result in a lower farm income level, with corresponding reduction in farm purchasing power.

Why would farmers vote against controls at this time when they've lived with them for the past few years? For one thing, the present acre allotments are too small for many growers to make a living. For another, high-protein wheat producers believe they are being penalized for a surplus situation caused mainly by low-quality wheat producers (low-grade stuff gets the same price crop protection as the better grades). Many farmers believe they can make a better living by planting to capacity and volume production.

Although Congress is getting steamed up over this, chances are nothing will be done unless and until controls actually are vetoed. Then, most likely action is to provide higher support than the nominal (50 per cent of parity) level provided by law if quotas are out.

There will be no increase in cotton acreage this year. The 1955 national allotment stands at 18.1 million acres, down from 21.4 million acres in 1954. Cotton booster bills were knocked in the head in the Senate when wheat state lawmakers wanted similar treatment. As a result of no increase this year, the Agriculture department figures about 55,000 share-croppers, tenants, etc. will be forced off the land this year. The department, at the same time, had been resisting any increase in acreage.

Corn acre allotment compliance will be better this year than last when only 40 per cent of farmers stuck with allotments. Reason is that most farmers get bigger allotments and it will pay more to grow for the loan than to feed—since supports for other feed grains will be down 1/5.

Corn allotment for this year is 49.8 million acres, up about three million acres from a year ago. Farmers will try this year to make big increases in per-acre yields; it may be the last year of high support for corn.

The future of fertilizer shipments abroad under foreign economic development programs is up in the air as we go to press. The Foreign Operations Administration goes out of existence in June. Under an Administration plan, FOA policy and programs will be turned over to the State department. Many FOA administrators also are expected to go over to State.

Actually, from the early signs, there's very little question that the fertilizer program will be continued. This may be so since much of FOA policy was under jurisdiction of the State department anyway. Large quantities of fertilizer have been sent abroad under the old FOA program.

DuPont Reports on Karmex DL

LAST year, over 9,000 acres of cotton were treated for pre-emergence weed control with DuPont's new substituted urea herbicide, Karmex DL.

About 75 per cent of the acreage was located in the Mid-South and the material was used on a commercial basis in the Piedmont areas of the Carolinas, Georgia and Alabama and the Delta areas of Mississippi, Arkansas and Louisiana.

DuPont reports that many growers had difficulty in evaluating the effectiveness of Karmex DL because freezing temperatures required that two to three times the normal amount of acreage be replanted, a procedure that disturbed the treated soil and reduced effectiveness of the control.

Good Control Reported

Generally, good control was reported, however, of seedlings of weeds such as crabgrass, pigweed, purslane, cocklebur, lambsquarter and watergrass. Control lasted from three to eight weeks, according to the company, and appreciable savings over hand-hoeing resulted.

This year the material will be available for commercial use on cotton in the states mentioned above and Tennessee, the Red River valley area of Texas and Oklahoma and Southeastern Missouri. Test work will be continued in other cotton states.

This field was planted April 13, 1954, and photographed on May 25. Middles have been cultivated, but undisturbed bands show effective weed control with Karmex DL herbicide, which was applied at planting time.

Dan Blanchard, manager of W. H. North Plantation, Dixie, La., shows the width of band in a test plot where grass seedlings have been controlled by pre-emergence application of DuPont company's Karmex DL herbicide.

DuPont reports that soil type seems to be critical in determining the margin of safety when using Karmex DL for pre-emergence control in cotton. On clay or high organic soils, doses of three pints per acre generally provide good control with no crop injury. About two pints gave comparable results on light sandy soils.

Tests have shown that application at recommended rates is reduced to a harmless level on soils sampled within eight to twelve months after application.

Moisture is required to activate the chemical, and effects are often slow to appear and may not become evident until after precipitation. Herbicidal effectiveness is not destroyed by heavy rainfall; it often assists in obtaining better weed control. It is pointed out that if beds are not slightly elevated, rain could wash untreated soil onto the beds, reducing effectiveness.

The relatively insoluble material is carried into the upper ¼–½″ zone of soil. Seedling weeds may grow to ½–¾″ before being affected, and DuPont stresses the importance of waiting for the chemical to do its job. It must reach the roots to be effective.

The material offers several advantages, according to DuPont—relatively low use cost, low toxicity to warm blooded animals under recommended conditions, non-flammability, non-corrosiveness and non-volatility. It is marketed as a semi-liquid suspension. ◆

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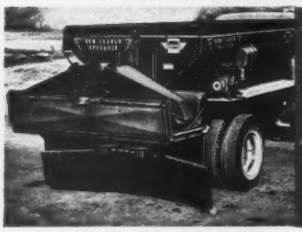

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Workers report on stored grain sprays, sulphenone, other farm chemicals at

ACS Cincinnati Meet

STUDIES of amino triazole, systemics, sulphenone, stored grain sprays and other pesticide materials were presented at the Cincinnati, Ohio, meeting of the American Chemical Society, March 29 to April 7.

Amino Triazole

Kenneth A. Sund, from American Cyanamid's Stamford, Conn., laboratories reported that amino triazole (3-amino-1,2,4-triazole) shows promise as an herbicide for control of Johnson grass, nut grass, foxtail, quack grass, Canada thistle and poison ivy. He stated that greenhouse tests show that wetting agents have increased the herbicidal efficiency on monocotyledenous plants.

The material is absorbed by roots and aerial plant parts and is translocated to the growing points. Its effect, Sund added, can be recognized by albinism produced in meristematic tissues. Not only is new growth affected through an inability to synthesize chlorophyll, but carbohydrate metabolism, respiration and general growth are also influenced by amino triazole applications.

Considerable promise was reported with spray treatments, but with soil treatments it was found that dosage rates must be correlated with soil types and crops.

Another researcher from the Stanford labs, Elton L. Clark, reviewed studies of O,O-dialkyl S-(alkyl-mercaptomethyl) dithiophosphates as systemic insecticides. They were found to possess high activity and some 35 variations of the molecule were evaluated in the study.

New Herbicide Class

A. J. Speziale, Monsanto Chemical co., presented a paper on N-substituted alpha-chloroacetamides, a new class of herbicides shown to possess outstanding effectiveness and selectivity, especially for control of annual grasses.

Herbicidal activity of the alpha-chloroacetamides has been correlated with respect to variations of the N-substituents and the acyl chain. Compounds of diverse structures such as the diethyl, diallyl, dipropyl, cyclohexyl, tetrahydrofurfuryl, chloroallyl and achloropropyl amides, the N-alkylanilides and the morpholide and piperidide of chloracetic acid have exhibited the exceptional grass-specific phytotoxicity.

Comparisons on insecticidal efficiency of combinations of pyrethrins and piperonyl butoxide in powders, oil sprays and emulsions for protection of stored grains were included in a paper delivered by W. E. Dove, Fairfield Chem. div., Food Machinery & Chem. corp.

Dove reported that the development of oil-free sprays is another safe and effective step in the practical use of insecticide materials already known for their unusual safety.

R. W. Fogleman, Hazelton Laboratories, reviewed a detailed study on the toxicity of trinitrobenzene-aniline complex and evaluation of its safety for use as a rodent repellent. Acute oral LD_{50} in rats for the complex is 370 mg/kg and for trinitrobenzene, 505 mg/kg.

The complex, said Fogleman, appears to be moderately toxic in single doses but the effects of repeated doses are cumulative.

Sulphenone Studies

Toxicological studies of sulphenone were reported by L. W. Hazelton of Hazelton Laboratories. The technical material is composed principally of p-monochlorophenyl phenyl sulfone, and small quantities of diphenyl sulfone and bis (p-chlorophenyl) sulfone are also present.

The acute oral LD_{50} of the purified material is 3650 mg/kg for male albino mice and over 2000 mg/kg for male albino rats, according to Hazelton. Over a two year period, levels of 10 and 100 ppm in the diet of male rats and 100 ppm in females caused no significant difference in food consumption, average body weight or survival.

At 1000 ppm in males, food consumption and survival were normal, while average body weight was significantly lowered. Organ weights were within normal limits, except that the liver weight was increased in the male group receiving 1000 ppm. Gross observation during the two year period and at autopsy showed no abnormality characteristic.

Daily oral doses of 10 mg/kg resulted in no evidence of toxicity to dogs, said Hazelton, after periods of up to 604 days. Although fluctuations occurred, there were no effects on appetite, body weight or gross appearance, and there was no significant gross or microscopic pathology. In addition, there was no evidence of storage in the muscle, liver, kidney, fat or brain of either dogs or cats.

W. F. Barthel of USDA's Beltsville station reviewed a new rearrangement reaction by which insecticidal phosphates have been obtained. He stated that dehydrochlorination of O,O-dialkyl 2,2,2-trichloro-1-hydroxyethyl phosphonates (the first member of this series is the insecticide L 13/59) causes rearrangement of more volatile highly insecticidal dialkyl 2,2-dichlorovinyl phosphates.

New compounds were reported, several of which possess high insecticidal activity, and Barthel reported that dehydrochlorination of O,O-diethyl 2,2-dichloro-1-hydroxyethyl phosphonate converted it to the systemic insecticide,

diethyl 2-chlorovinyl phosphate, a compound which could also be prepared by the Perkow synthesis.

A paper by Joseph R. Harris, Utah Agricultural Experiment Station, considered the effects of feeding dieldrin and heptachlor treated alfalfa hay to dairy cows. During the four month test the animals were fed hay which had been dusted with the insecticides in four treatments, one and four ounces per acre of either heptachlor or dieldrin.

Milk samples were taken at the end of each week, and at the end of the experiment butter was churned from a composite sample of cream separated from the milk of the two animals on each treatment. Two animals were sacrificed, one on each high treatment, and samples of fat, muscle, kidney and liver tissues were analyzed.

Dieldrin residue on the hay averaged 0.52 and 1.5 ppm for the one and four ounce treatments respectively, and heptachlor residues were 0.06 and 0.25 ppm. No heptachlor was found in the milk, but a small amount of heptachlor epoxide (0.17 ppm) and dieldrin (1.3 ppm) was present. Heptachlor epoxide was also in the fat tissue (0.12 ppm) and in the butter (0.25 ppm). Dieldrin was found in both the butter (40 ppm) and in the fat tissue (3 ppm).

Other papers delivered at the ACS sessions reported on determinations of various pesticide materials, toxicity studies on endrin, heat stability of some thiophosphate insecticides and oxidation of schradan. ◆

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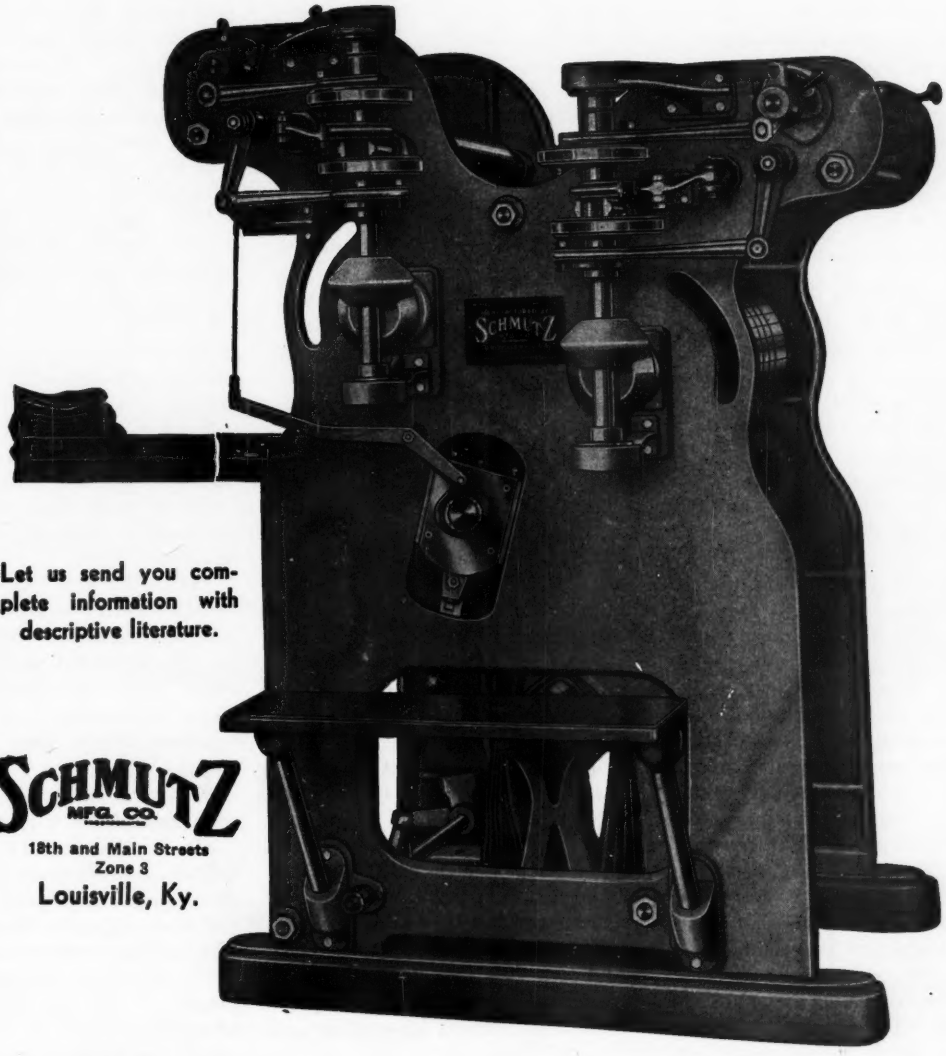

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Harold Krueger shows that

Small Plant Safety Programs Do Pay Off

SMALL plant safety programs can work, says Harold R. Krueger, production manager for the Snyder Chemical co., Topeka, Kan., if there is a safety conscious top management, direct placement of responsibility and a planned safety organization.

Discussing this phase of the overall safety problem before the Southern Safety conference at the Feb. 28 meeting in New Orleans, he stressed that the services of a full-time safety engineer are not a requirement for a successful program.

Safety's Costs, Returns

In the small plant the owner or operator normally supervises many operations and is, therefore, the top man in a safety program for his firm. Krueger pointed out that such operators first ask "What does it cost in time and money, and what are the returns?" Lets look at his comments on each of these points.

Time. "If a person desires to be safety conscious . . . it requires no more time to think of a safe way to perform a task than a careless way. . . Everytime you walk through the plant observe how the men are working . . . look especially for slipshop methods and careless attitudes. . . Take a few extra seconds to inspect machinery for danger points that might be provided with guards . . . insist on good lighting and good housekeeping. . . A few extra minutes a day will do the job and also impress upon the workers that you, personally, are sold on safety."

Money. "The returns for reduction of accidents are so great that it is almost absurd to think about the costs. . . A few dollars for machinery guards, replacing some worn steps or dangerous ladders, a few extra lights and a couple of good brooms will do wonders for your plant." Krueger also recommended the investment of $25 in Fertilizer section, National Safety Council membership.

Returns. "There are returns in increased production due to greater efficiency of the workers . . . in decreased maintenance costs due to more care being exercised in use of equipment . . . in reduced premiums of compensation insurance due to rates being based on lowered accident frequency . . . in less shrinkage of saleable materials due to better housekeeping and returns in overall morale of the worker due to better working conditions."

So that your foreman or superintendent can be of maximum value to the program he must be sure of two things, added Krueger, that "you actually believe in the program yourself" and that it is part of his job to see it carried to workers.

Impress upon him, he continued, that elimination of accidents is the greatest cost-cutting factor he can employ and convince him that an operation must be performed safely to be efficient.

Krueger stressed that reaching the worker is an educational job and the foreman should know the correct and safe way to perform any physical job in the plant. He should also know all danger points in the plant.

New employees, said Krueger, should get special attention with careful instructions and examples designed to prevent later injury.

Safety Meetings

Regular safety meetings of all of the plant crew are of great value and at the Snyder plant, luncheon meetings have been found most effective. Employees are furnished with sandwiches, coffee or soft drinks and dessert, and a short program is presented after lunch.

Every other meeting, Krueger explained, is a "case-history" affair in which any employee involved in, or near an accident, is required to tell what happened, the cause and how he thinks it could have been avoided.

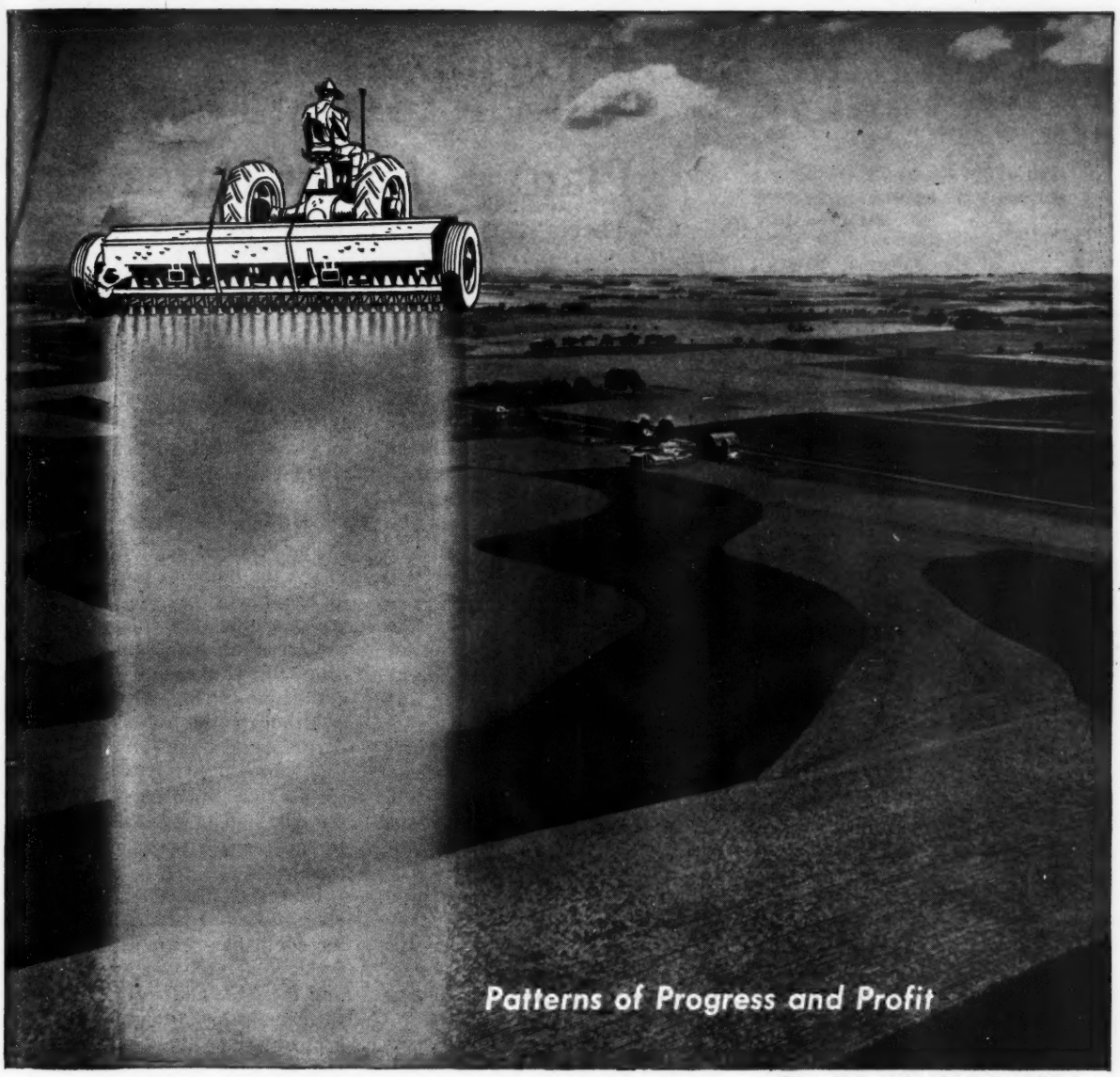
He cautioned that the first meeting or two of this type might seem to fall flat, but that employees soon develop interest and readily participate. Insurance carriers are used as a source of material for other luncheons, furnishing speakers and films.

Krueger emphasized that proper maintenance contributes greatly to accident reduction and that it goes "hand in hand" with safety, paying dividends in longevity of men and machines.

Reviewing the use of "no lost time accident" signs, with changeable numerals for days involved, he recommended that these and other visual aid posters be kept clean, up-to-date and posted in locations where they are readily seen.

Elements of a planned safety organization for a small plant include, said Krueger, a safety committee, investigation of accidents, plant inspection, good housekeeping, first aid, safety bulletin boards and accident records and reports.

"It isn't what we get out of the program," he concluded, "rather what do we give to it. In dedicating yourselves to this safety work, you make an invaluable contribution to your fellow-workers, making the tasks more pleasant, the environment brighter, the jobs more secure and your plant the best place in the world in which to work." ◆



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Join the 1955 Fertilizer Plant Safety Contest

THIS year the Fertilizer section of the National Safety Council is once again conducting a fertilizer plant safety contest, a program that has already gained the support of most large fertilizer producers.

F. W. High, Baugh & Sons co., the contest chairman, stresses the need for increased participation by small fertilizer concerns for, as he points out in a recent letter, the goal of decreased costs of compensation insurance can be obtained only through active participation by a large majority of the industry.

Those of you who operate a small or moderate sized plant are in special need of a better accident prevention program, for it has been shown that, as a rule, such plants have the highest frequency rate and the biggest accident costs.

We hope that you will back the section in its drive for increased plant safety by actively participating in the 1955 contest. Along with entry into the contest, take another look at your past safety records. If they resemble those of many fertilizer operations, a definite improvement is needed, so why not consider the possibilities of a regular safety program?

Should you feel that you cannot afford the small amount of time, effort and money needed to develop such a plan, review the comments of Harold Krueger, Snyder Chemical co., which appear in another article in this issue. He shows very definitely the requirements are small and the rewards can be considerable.

1954 Contest Results

Now for a brief look at the results of the 1954 safety contest which show a decided improvement in accident rates among the 164 participating plants.

Although 33,316,000 man-hours were reported, a 53 per cent increase over the 1953 figure, a 3 per cent decrease in injuries was noted, along with a 19 per cent drop in frequency rates. The totals of 507 accidents and frequency rate of 15.22 for 1954, compared to 523 and 24.07 for the previous year, show the value of safety awareness in participating plants.

On a following page we have included an Honor Roll of plants entered in last year's contest, those which completed 1954 with either a perfect accident frequency rate or with a rate above the average for plants of their particular contest group.

How to Get Entry Form

The Fertilizer section would like to see the name of your company in the honor roll for 1955, and you can obtain an entry form and contest rules by completing the coupon at the bottom of this page and mailing it to Wayne High.

Although the rules state that participants should be members of the National Safety Council, the section has not strictly enforced the rule and it is possible for you to enter even though not an NSC member.

However, membership fees are very modest (only $25 per year for companies with less than 100 employees) and you are urged to join the NSC and actively support the worthwhile program that has been developed under the leadership of such safety-conscious men as Vernon Gornto, Tom Clarke, Curtis Cox, Wayne High, Larry Shopen, Harold Krueger, E. O. Burroughs, Jr., A. B. Pettit, R. G. Diserens and many others.

As Vernon Gornton recently pointed out, insurance premium rates are determined by the average cost of accidents in all fertilizer plants in your state and a maximum reduction in rates is dependent upon the efforts of all companies involved. With the base of a good plant safety program, supported by membership in the National Safety Council and active interest in the Fertilizer section contest, you can do your part in effecting these financial savings along with all of the other benefits derived from successful accident prevention. ◆

F. W. High, Contest Chairman
Fertilizer Section
National Safety Council
c/o The Baugh Chemical co.
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We want to actively support the Fertilizer section, National Safety Council, in its efforts to improve fertilizer plant safety.

☐ **Please send an application form and a copy of the contest rules so that we can enter the 1955 fertilizer plant safety contest.**

☐ **Include an application blank for membership in the National Safety Council.**

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Baugh Chemical. Baltimore, Md.
Wilson & Toomer, Jacksonville.
Robertson Chem., Norfolk, Va.
I. P. Thomas & Son, Paulsboro, N.J.
Swift Plant Food div., Harvey, La.

Operated less than 85,000 hours, Jan.-Apr. Average Frequency Rate—20.19.

Perfect Records

Virginia-Carolina, Selma, N. C., Durham, N. C., Lynchburg, Va., Rome, Ga., Greenville, S. C.
F. S. Royster Guano, Macon, Ga.

Above Average

Southern Fert. & Chem., Hutchinson Island.
Virginia-Carolina, Birmingham, Ala., Portsmouth, Va., Nichols, Fla., Mobile, Ala., Augusta, Ga., Dothan, Ala., Savannah, Ga.
Davison Chemical, Wilmington, N.C.
Spencer Chem., FGAN Section, Jayhawk Works.
F. S. Royster Guano, Charleston, S. C.
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Davison Chemical, Lansing, Mich.

Operated less than 58,000 hours, Jan.-Apr. Average Frequency Rate—14.72.

Perfect Records

Canadian Industries Ltd., Beloeil.
Swift Plant Food div., La Grange, Atlanta, Ga., Greensboro, N. C.
Southern Fert. & Chem., Atlanta.
F. S. Royster Guano, Bessemer, Ala., Charlotte, N. C.
Contentnea Guano co., Wilson, N.C.

Above Average

Virginia-Carolina, Ft. Wayne, Ind., Mt. Pleasant, Tenn.
F. S. Royster Guano, Indianapolis.
Swift Plant Food div., Cleveland, O.

DRY MIX UNITS

Operated 42,500 hours or more, Jan.-Apr. Average Frequency Rate—14.61.

Perfect Records

Canadian Industries Ltd. Chatham.
Davison Chemical, Savannah, Ga.

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Davison Chem., New Albany, Ind.
Baugh & Sons, Portsmouth, Va.
Swift & co., Madison, Wisc.
Smith-Douglass, Danville, Va.
F. S. Royster Guano, Money Point, Va., Wilmington, N. C.
Swift Plant Food div., Greenville, O.
Robertson Chem., Wilmington, N.C.

Operated 20,000-42,000 hours, Jan.-Apr. Average Frequency Rate—11.10.

Perfect Records

Davison Chem., Gretna, La.
Swift Plant Food div., Los Angeles, Calif., Savannah, Ga.
Virginia-Carolina, Jacksonville, Fla., N. Little Rock, Ark.
Smith-Douglass, Albert Lea, Minn., Kinston, Tex.
Smith-Rowland plant, Norfolk, Va., Granite City, Ill.
Snyder Chem., Topeka, Kan.
Southern Fert. & Chem., Charleston, Louisville Rd.
F. S. Royster Guano, Spartanburg, S. C., Lynchburg, Va.
Robertson Chem., Statesville, N. C.

Above Average

Swift, Plant Food div., Houston, Tex.

Operated less than 20,000 hours, Jan.-Apr. Average Frequency Rate—18.65.

Perfect Records

Canadian Industries Ltd., Halifax, Montreal.
Virginia-Carolina, Wadesboro, N. C., Atlanta, Ga.
G. L. F. Soil Building Serv., North Collins, Big Flats, N. Y.; Bridgeton, South Kearny, Englishtown, N. J.; Union City, Pa.
Southern Fert. & Chem., Roebuck plant.
Snyder Chem., Hutchinson, Kan.
Smith-Douglass, Smith-Rowland plant, Selbyville, Del.
Arizona Fert., Toltec, Yuma, Ariz.
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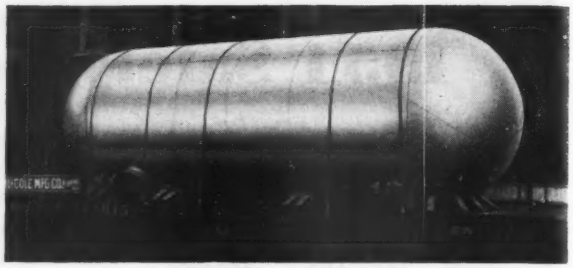

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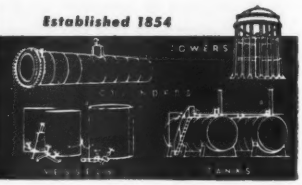

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Effects of Insecticides on Phytotoxicity and Off-Flavor

By J. G. Watts

Entomologist
South Carolina Agricultural Experiment Station
Blackville, S. C.

PLANT injury from insecticides in the soil is not new or peculiar to organic insecticides. The accumulation of lead arsenate in orchard soils of the northwest and calcium arsenate in cotton fields of the southwest and their injury to subsequent crops is well known. However, the organic insecticides of the past decade have focused attention on the general subject of soil residues to an extent not previously encountered. On the other hand, the association of odor and flavor contamination in crops by insecticidal chemicals is identified very largely if not entirely with the organic insecticides, particularly with the chlorinated hydrocarbons.

Effect on Phytotoxicity

THE expression of phytotoxicity to an insecticide may involve nothing more than retarded growth. The degree of phytotoxicity on roots and foliage may vary with the formulation, the soil type, soil colloids, soil *p*H, crop, variety and possibly with other factors. Neither foliage nor root sensitivity can be used as a reliable criterion of sensitivity for the other. The more volatile insecticides, such as BHC, lindane and parathion, are sometimes more toxic in the soil than equal amounts of those with lower vapor pressure. The non-insecticidal components often may be the major offenders in phytotoxicity and off-flavor (12).[2]

DDT

Many crops appear to be highly tolerant of DDT, expecially the purified form, but there are a number of notable exceptions. One investigator lists 17 vegetables, 17 cereals and grasses and 248 ornamentals which were not injured by 25 ppa[3] (9). The marked difference in plant species sensitivity is illustrated by two varieties of sweet corn which grew normally on soil containing 1,000 ppa (13), while rye was damaged by 10 ppa (48). Tomato and beans were severely stunted by 850 ppa while lettuce and cabbage were stimulated. Injury developed in all DDT treated plots upon the application of 5–7–8 fertilizer. Compost had no such effect (31). The growth of onion, soybean, tomato, lima bean, spinach and strawberry plants was retarded by 25 ppa (10), but the green weight of a rye-barley-vetch-crimson clover cover crop was reduced 15 to 25 per cent by 400 ppa and 30 to 40 per cent by 1,200 ppa (17). Cotton is tolerant of fairly high rates of DDT but certain other crops, such as cow pea, Austrian winter pea, rye, oats and tobacco, which are often grown in rotation with cotton are much more sensitive (1).

Germination of corn was retarded by rates of DDT above 6.25 ppa but this initial delay was followed by more rapid growth than in the untreated controls (5); germination and plant growth was adversely affected by 200 ppa (25). Elsewhere, this rate had no noticeable affect on germination and early growth of corn, peanut, cotton and soybean (19). Delayed germination was the only response of Bountiful beans to 2.7 ppa (30).

Plant response is different on different soils. In a sand-clay mixture 103 ppa of DDT caused a significant increase in secondary bean root development while "Colorade 9" (2,2-bis-(*p*-bromophenyl)-1,1,1-trichloroethane) caused a significant reduction (14). On Grady sandy loam, a heavy soil with considerable organic matter, 1,000 ppa of DDT caused no apparent reduction in germination or plant growth in 19 field and truck crops (45). Abruzzi and Rosen rye and Black Valentine beans are highly sensitive to 100 ppa in mineral soils, and sensitivity is expressed to as little as 25 to 50 ppa. Other beans, beets, most legumes, cucurbits and tomato were moderately to highly sensitive. Most grains, Cruciferaceae and Irish potato were moderately to highly tolerant. Most plant species are highly tolerant of 100 ppa, while some are injured by 25 pounds on soils low in organic matter (13).

Soil *p*H is also important. Plants were more sensitive at *p*H 5.4 than at 4.5. The relative response of two plants on the same soil may

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[1] South Carolina Agricultural Experiment Station Technical Contribution No. 230.

[2] Numbers in parentheses refer to literature cited.

[3] In this paper, ppa is used as an abbreviation for *pounds per acre.*

be reversed by the addition of lime. For example, on Sassafras loam, 25 ppa injured Abruzzi rye while Black Valentine beans showed less injury. When lime was added to the soil the beans showed severe injury while the rye was less injured (7). The differences in plant response on different soil types and at different *p*H's may help to explain conflicting results reported by different investigators.

In carefully controlled laboratory experiments cucumber root inhibition occurred at insecticidal concentrations that were found stimulating to aerial growth. Minimum phytotoxicity of technical DDT occurred between *p*H 6.0 and 7.0. The nature of the action, whether stimulatory or inhibitory, depends upon the concentration. In 1×10^{-3} molar, unbuffered solution, cucumber root elongation was inhibited between *p*H 2.0 and 6.0, and stimulated between *p*H 7.0 and 11.0. This change of activity may be due to various factors, among which are degredation, solubility, ionization or change of plant response with *p*H. Of the impurities present in technical DDT, only 2-(p-chlorophenyl)-1,1,1-trichloroethanel showed a high toxic action (4).

A degredation product of DDT, 4,4'-dichlorodiphenyl acid (DDA), is highly phytotoxic. This compound appears as a metabolite of DDT in rabbits (47) and might possibly occur as a metabolite in plants. It appears that DDA inhibits primarily by affecting membrane permeability. The slow and delayed effect of DDT in certain cases where continued applications are made over an extended period suggests that the toxic action may be due to metabolites (4).

Several authors have suggested an auxin-like activity for DDT. In an unbuffered nutrient solution in which no auxin was present, DDT stimulated plant growth, while it inhibited growth when an auxin (indol-3-acetic acid) was present. This further indicates a relationship between DDT and auxins in the plant metabolism. Methoxychlor and gamma BHC caused stimulation to stem sections of Kentucky Wonder bean greater than was attained with 2,4-D. In certain cases a beneficial action of the insecticide to the plant, other than mere insect control, appears possible (2).

In four widely different soil types 25 ppa of DDT has persisted without change in the amount recoverable by chemical analysis or in toxicity to sensitive crops for about 4½ years (12).

Benzene Hexachloride

Most crops are sensitive to BHC when mixed in the soil in appreciable amounts. While species sensitivity varies appreciably, few appear highly tolerant. Typical symptoms are characterized by cell elongation and pronounced thickening of tissues. Certain reports in the literature are at variance concerning the influence of BHC on germination. Foster (13) stated: "Except at very low concentrations it has generally interfered with germination." Cullinan (7) stated: ". . . emergence is affected but not germination." The apparent discrepency probably lies in a strict interpretation of the word *germination* by Cullinan and a very liberal interpretation by Foster, to include the successful establishment of the seedlings. A number of authors explain in some detail that germination, in general, is unimpaired by BHC except at exceedingly high rates but that the seedlings of many plants perish at higher concentrations.

BHC, 10 per cent gamma isomer, at 27.5 ppa was highly toxic to many vegetable crops. Lambsquarters, pigweed and bindweed were controlled by this amount for more than five months while cruciferous and umbelliferous plants were unaffected (31). Injury to garden pea was slight at 15 and severe at at 60 ppa of 30 per cent gamma isomer (38). There was normal growth of onion at rates of crude BHC below 200 ppa (28). Technical BHC at 50 and 83.3 ppa in a single soil application reduced the stand of tobacco the first year but increased the yield the third year, perhaps due to root knot nematode control which was noticeable the second and third years. These rates did not affect cotton nor did 20 ppa annually for three years. Rye was less sensitive to BHC than to DDT. The yield of cow pea in the hull was increased by BHC (1). Technical BHC, 30 per cent gamma isomer, at 100 ppa greatly reduced seedling survival and early growth of cotton, corn, peanut and soybean (19) and 800 and 2,400 ppa, 13 per cent gamma isomer, completely eliminated a cover crop mixture of rye-barley-vetch-crimson clover. The green weight was reduced more than 50 per cent by 80 ppa (17). "Gammexane," 10 per cent dust containing 1.3 per cent gamma isomer, at rates as low as 12.5 ppa strongly suppressed root growth of sugar cane when applied directly to the cane stock in the furrow. However, when the stock was first covered with ½ inch of soil, 100 ppa caused only limited injury (29). On Grady sandy loam, 19 field and truck crops showed moderate to severe reduction in stand at 120 ppa of gamma isomer from technical BHC. All except cow pea, calico lima and Henderson lima bean showed from very light to moderate reduction in stand at 25 ppa. At 12 ppa only grain sorghum was reduced in stand but this crop was not affected by 2.4 or 6.0 ppa (45). Elsewhere, technical BHC at 400 ppa reduced the stand of each of 15 crops. Subsequent growth of all crops tested was suppressed by 20 ppa, and 100 ppa was harmful to a majority. It is more toxic to later growth than DDT (13).

Year-old apple and peach nursery stock treated in a simulated spray schedule with BHC, 13 per cent gamma isomer, at rates up to 2,400 pounds had up to 50 per cent and 400 per cent, respectively, more twig growth than the controls during the ensuing two years. When the apple trees were removed and reset with year-old stock, there was 100 per cent mortality of the reset trees (17). Technical BHC, 10 per cent gamma isomer, and 66 per cent other isomers, at about 325 ppa, applied in the furrow just before planting, killed all apple nursery stock. Surface applications of four times this amount around year-old trees produced no injury (41). Nursery conifers were slightly retarded by 5 ppa of gamma isomer of BHC (15). At 200 ppa all BHC isomers (alpha, beta, gamma, delta and epsilon) were phytotoxic to Norway pine, but at 20 ppa, only the delta isomer produced definite inhibition of root growth. Under alkaline conditions BHC breaks down into a mixture

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of trichlorobenzene components. This crude mixture and three of its known trichlorobenzene components all inhibit pine root growth. Hepta- and octachlorocyclohexane, two impurities in crude BHC, showed less inhibitory tendency than crude BHC. Gamma isomer of BHC at 1 ppa produced malformed roots in most of 20 species of conifers. Soil particle size and *p*H exercised little influence on root malformation by BHC. However, when peat was added to white sand at 25 per cent by volume the effects of the BHC were no longer apparent. None of the chemicals tested, with the possible exception of biotin, possessed the capacity to overcome the injurious effects of BHC on pine roots (42).

The phytotoxicity of technical BHC, 12 per cent gamma isomer, at 100 ppa persisted in case of some crops from September 1946 to December 1949. In a normal four year spray schedule technical BHC accumulated under peach trees in quantities which remained toxic to four successive plantings of such crops as blue lupine and rye (12).

Lindane

On some crops lindane, 99+ per cent of gamma isomer, is much less phytotoxic than certain other isomers or a mixture of isomers of BHC. Out of 23 varieties of vegetables and flowers lindane retarded the growth of one at 2 ppa, three at 4 ppa and 5 at 8 ppa. At rates required to kill 3rd instar Japanese beetle grubs lindane was injurious to more crops than aldrin, dieldrin, endrin, heptachlor or isodrin (11). As a seed treatment 25 per cent lindane at 2.5 parts by weight reduced emergence of beets. Amounts above 0.25 parts by weight caused injury to Henderson lima bean and milo. Different varieties of large lima beans differ in susceptibility to injury from lindane (26). Technical BHC at 110 ppa inhibited damping-off in Fordhook lima beans (15); however, seed and seedling decay increased following treatment with 2 ounces of 75 per cent lindane per 100 pounds of seed (27).

The 99 per cent pure BHC at rates up to 400 ppa had no effect on germination and stand but suppressed growth of nine vegetable crops as seriously as equal quantities of the technical grade (13). Lindane at 4 ounces per bushel of corn reduced the stand 30 to 40 per cent while 1 ounce produced negligible injury. Storage of treated seed for 18 months produced no further injury beyond that immediately apparent (3).

Chlordane

One report (13) indicates that chlordane, soon after application to the soil at 100 ppa, is more injurious to germination and stand than technical BHC; however, results contrary to this prevail elsewhere (46). The stand of most crops is suppressed by 25 ppa. Corn is tolerant and honey dew melon is especially sensitive (13).

Degree of phytotoxicity on roots and foliage varies with a variety of factors. Non-insecticidal components may often be major offenders in both this and off-flavor. Some plants are far more susceptible than others to flavor alteration; and processing of foods, especially under pressure, seems to accentuate the off-flavor.

Slight stunting and chlorosis of lima bean was produced by 27.5 ppa (31); the stand of bush beans and turnip was reduced but pole beans, carrot, cucumber, onion or squash were not affected by 34.8 ppa (43), and the green weight of a cover crop mixture of rye-barley-vetch-crimson clover was drastically reduced by 400 and 1,200 ppa (17).

While a number of seeds were tolerant of DDT, BHC and toxaphene, their germination was severely affected by chlordane (7). Sugar beet germination was unaffected by seed treatment with 2 parts by weight of a 50 per cent wettable powder, and 2 ounces of 40 per cent per 100 pounds of seed had no effect on Fordhook lima beans (26). Nursery conifers are tolerant of 20 ppa (15). Twenty species were unaffected by 10 ppa and root growth and vigor of Norway pine was unaffected by 100 ppa (42).

When 10 ppa of chlordane was applied to an established turf, one-third remained after 1 ½ years, one-twentieth after 2½ years, with little further change during the next 3 years. Although there was considerable variation in the retentive capacity for chlordane among 83 mineral soils, the most influential factor appeared to be the organic content (49).

Toxaphene

Toxaphene is susceptible to breakdown by soil organisms (16). In Chester soil it appeared to lose its toxicity for sensitive plants after four to six months (12). However, another investigator (44) found by chemical analysis that when 20 ppa were applied in each of 3 consecutive years 62 per cent of the toxaphene remained in the soil 10 months after the third application.

Some investigators report that soil application of toxaphene at quite heavy rates is relatively nontoxic to many crops. For example, 27.5 ppa injured none of 29 different vegetable crops (31), and 720 ppa caused no apparent reduction in stand or plant growth of 19 field and truck crops (45). On the other hand, substantial injury has occurred in some cases. At 400 ppa it reduced by about one-third the green weight of a rye-barley-vetch-crimson clover cover crop (17), and substantially reduced potato yields at 20 ppa (44).

There is limited evidence that toxaphene at 100 ppa somewhat depressed germination of all vegetable crops tested except sweet corn. Only tomato and watermelon were significantly affected (13).

Aldrin

Like certain other related compounds, there is wide variability in plant species sensitivity to aldrin. At 80 ppa (32) aldrin caused no noticeable injury to sod grasses. Corn, flax and soybeans germinated and grew well at levels as high as 128 ppa. There is some evidence of increased seedling emergence of corn and winter wheat and of growth stimulation of several crops at 2 and 4 ppa of aldrin and dieldrin (6). Barley was suppressed at rates above 32 ppa, buck wheat and winter wheat at rates above 8 ppa and oats and rye at rates above 4 ppa. It retarded growth of 2 out of 37 varieties of

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vegetables and flowers at 1.5 and 3.0 ppa. At 6 ppa 6 of the varieties were retarded (11).

As a slurry treatment, 2 ounces of 25 per cent aldrin or dieldrin per 100 ppa of Fordhook lima bean seed reduced seedling weight and slightly delayed emergence of seed of low germination but did not affect seeed of high vigor (26) (27), and seed decay was greater among treated seed (27).

Dieldrin

Sod grass was not injured by as much as 80 pounds of dieldrin during the first growing season (32). Barley, buck wheat, corn, flax, oats, rye, soybeans and winter wheat emerged and grew well at rates as high as 128 ppa. It retarded growth of 2 out of 37 varieties of vegetables and flowers at 3 ppa and 7 of the varieties were retarded at 6 ppa (11).

Heptachlor, Endrin, Isodrin

Growth of 4 out of 23 varieties of vegetables and flowers was retarded by 8 ppa of heptachlor, one out of 34 by 0.6 ppa of isodrin, three out of 34 by 2 ppa of endrin and 5 out of 34 by 4 ppa of endrin (11).

DDD

DDD at 107 ppa injured none of 29 vegetable crops tested (31).

Parathion

Parathion disappears from soils rather rapidly, as measured both by plant responses and chemical analyses. At 2 ppa it reduced the stand of bush beans, cauliflower and turnips but did not affect pole beans, carrot, cucumber, onion and squash (43). Heavy doses had slight but temporary depressing effect on germination and stand of several vegetable crops. When grown soon after application, tomatoes, muskmelons and snap beans were suppressed by 50 and 100 ppa while crops grown some months later were quite unaffected (13). Nursery conifers are generally tolerant of 15 ppa (15).

Effects on Off-Flavor

OFF-FLAVOR in fruits and vegetables imparted by soil insecticides embraces a wide range of acceptability, ranging from a strong characteristic and highly objectionable flavor to merely reduced quality, and even to the exceptional individual who finds natural flavors slightly improved. Some plants are far more susceptible than others to flavor alteration. Individual sensitivity to off-flavor is equally variable. The processing of food products, particularly under pressure, seems to accentuate the off-flavor. There is evidence that impurities and products of degredation are more responsible for flavor alteration than the insecticides *per se*.

Benzene Hexachloride

BHC off-flavor is not always immediately discernible but may develop later as an after taste (31). As the threshold of sensitivity is approached, the scoring, even by a trained panel, becomes erratic (34). A panel of tasters detected 0.25 p.p.m. of beta isomer in water more consistently than any of the other isomers, and this was followed in order by delta, gamma and alpha. A mixture of isomers imparted an off-flavor to tomatoes more consistently than any of them separately. In lima beans delta was most often detected, followed by commercial gamma and a mixture of isomers (8). Beta and delta applied to plants or mixed with the soil imparted a stronger off-flavor to edible portions than the alpha and gamma (37).

A trained panel of judges detected BHC contamination in peanut butter in dilutions down to 1.8 p.p.m. but not at 0.4 and 0.2 p.p.m. Significant differences in flavor were measured between peanut butter samples from peanuts grown following cotton which had been dusted with 3.8 ppa and 5.14 ppa of gamma isomer of BHC and the untreated check. Off-flavor apparently is not due entirely to BHC *per se*. When 10 to 15 p.p.m. of BHC were incorporated directly into peanut butter there was no definite differentiation between these samples and the control. The same held true for 1,2,4-trichlorobenzene, a major degredation product of BHC (34). Off-flavors were found in unroasted, roasted, and also in roasted and salted peanuts which had been grown in soil with 1 ppa of gamma from technical BHC. There was more off-flavor in potatoes french fried in oil from peanuts grown in soil treated with 1 ppa gamma isomer from technical BHC than when grown in soil treated with 1 of lindane or 4 of aldrin. Second and third batches of potatoes french fried in contaminated oils had increasingly more off-flavor than the first batch (16).

Flavors differed significantly between potatoes grown on soil treated the year previous with 1 ppa of gamma isomer from technical BHC, from lindane, and the control (24). Crude BHC at 1.5 ppa in the drill or 2.5 ppa broadcast did not give off-flavor to potatoes, but 7.5 ppa broadcast did (20). Potatoes grown in soil treated with 5 ppa of 50 per cent BHC wettable powder, gamma isomer content not indicated, were fed milking dairy cows at the rate of 20 pounds per day for 12 days. Off-flavor was detected in the milk from the day after the test started until 12 days after the feeding test was discontinued (28). At 27.5 ppa of 10 per cent gamma isomer of BHC no off-flavor could be detected in cabbage, broccoli, kohlrabi, mustard, celery, carrots, lettuce, endive, lima beans, tomatoes, peppers, parsnips, bush and pole beans but there was definite off-flavor in potatoes and uncooked corn (31). There was no off-flavor in the first year crop of strawberries grown on soil treated with 4 ppa of gamma isomer of BHC but there was mild off-flavor in frozen fresh and canned fruits of the second year crop (22). Some tasters could detect off-flavor in cooked lima and snap beans grown on soil treated more than 3 years previously with 100 ppa of 12 per cent gamma isomer of BHC (12). BHC, 3 per cent gamma isomer and 25 per cent other isomers, at 33 ppa caused off-flavor in dried red kidney beans and yellow wax beans (35). There was definite off-flavor in fresh peas and pole beans but was less pronounced in bush beans, carrots and cucumbers grown in soil treated with 2 ppa of gamma and it was less noticeable in case of high gamma formulations

(43). Two pounds of 6 per cent gamma and 44 per cent other isomers produced stronger off-flavor in Hubbard squash than in Table Queen (23).

Peach trees set in 1948 and treated in a simulated spray schedule both in 1948 and 1949 with 800 and 2,400 ppa of 13 per cent gamma isomer of BHC produced off-flavored fruits the third and fourth years after treatment (18). Technical BHC at 12.5, 16.7, 50 and 83.3 ppa caused off-flavor in tobacco the first year when made into cigarettes (1).

Lindane

Lindane at 1 ppa applied to peanuts in fertilizer caused significant off-flavor in peanut butter (36) and was recovered in peanuts at 8 p.p.m. (33). Unroasted, roasted and also roasted and salted peanuts were strongly off-flavor when grown in soil treated with either 1 ppa of lindane or 1 ppa of gamma isomer from technical BHC, but was more serious in the latter case. Where only 0.75 ppa had been applied to the soil there was off-flavor in peanut butter. There was off-flavor in the third batch of potatoes french fried in oil from peanuts grown in soil treated with 1 ppa of lindane but not in the first and second batches (16). At 4 ppa it caused off-flavor in radishes and cooked carrots but not in raw carrots, while at 1 ppa it caused no off-flavor in radishes or carrots, cooked or raw (8). Significant flavor differences were measured in potatoes grown in soil treated with 0.25, 1.0 and 4.0 ppa of lindane. BHC consistently gave a stronger off-flavor than lindane (24).

Chlordane

Chlordane at 2 and 4 ppa imparted an off-flavor to dried red kidney beans and yellow wax beans but it was not consistently detected (35). At 2 ppa it reduced the quality of fresh peas, pole beans and bush beans (43). Potato palatability tests were inconclusive but the resulting flavor was much less objectionable than with BHC (21).

Toxaphene

Although the evidence is inconclusive, off-flavor in potatoes following soil applications of toxaphene was more objectionable than with chlordane but less objectionable than with BHC (21).

Aldrin

There was off-flavor in the third batch of potatoes french fried in oil from peanuts grown in soil treated with 4 ppa of aldrin but not in the first and second batches (16). There was no off-flavor in first year crop of strawberries grown on soil treated with 4 ppa of aldrin but there was off-flavor in fresh frozen and canned fruits of the second year crop (22).

Heptachlor

In only one case was there any evidence of off-flavor in oil-cooked peanuts grown in soil treated with 2 ppa of heptachlor in fertilizer (36).

Parathion

Parathion at 2 ppa seemed to reduce the quality of fresh peas, pole beans and bush beans (43). ◆

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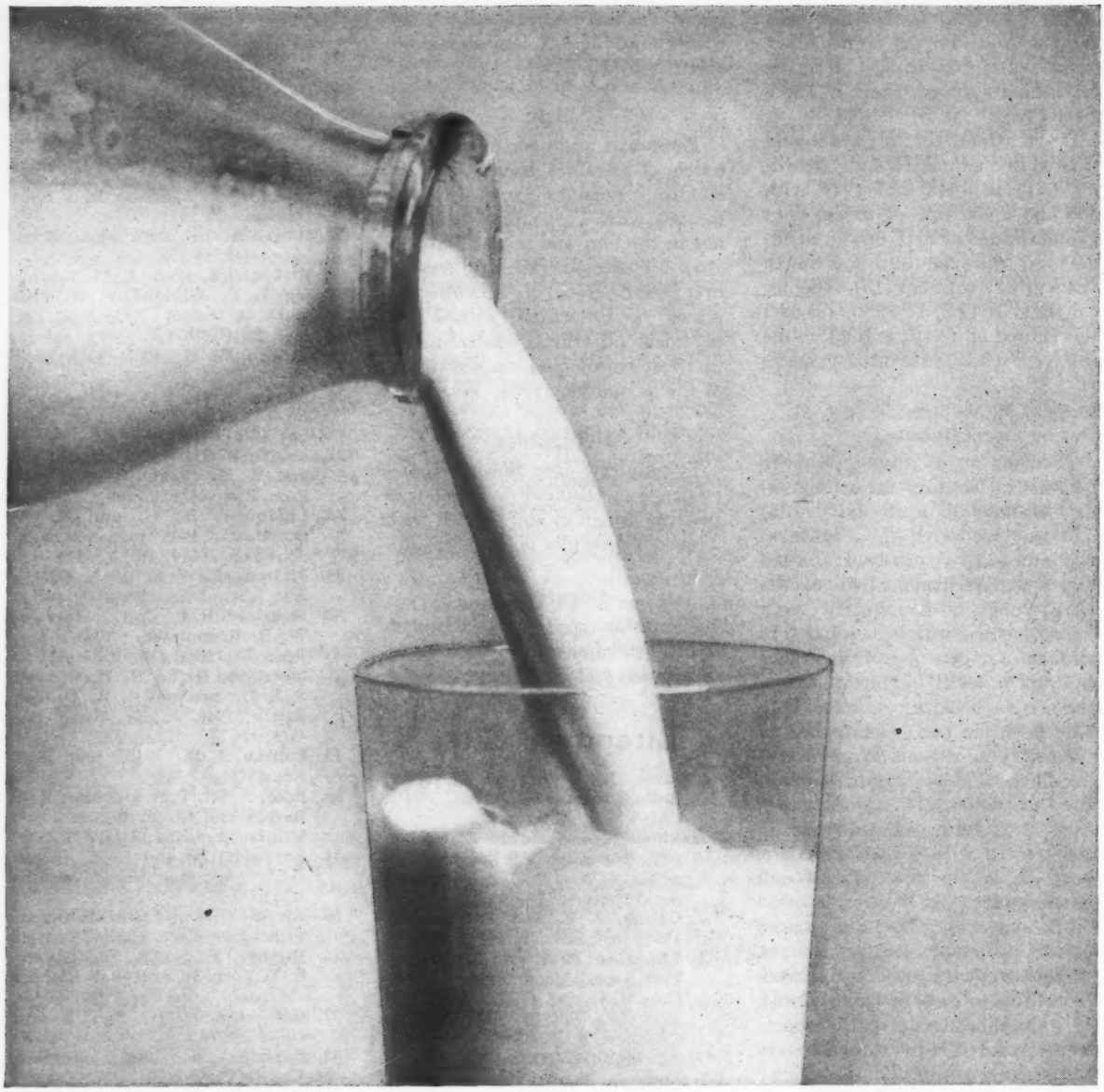

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PATENT REVIEWS

Apparatus for the Production of Phosphoric Acid

US 2,699,988, issued Jan. 18, 1955 to Andre Delruelle and assigned to Industrial and Financial Association, Inc., Panama, describes a method of controlling the temperature of the reaction mixture formed by the addition of sulfuric acid to ground phosphate rock. Removal of the heat of reaction is necessary, since it is necessary to maintain a temperature of 60 to 80° C in order to obtain the gypsum formed in a crystalline condition which will permit it to be separated efficiently.

As shown in Fig. 1, ground phosphate rock and sulfuric acid solution are mixed in tank (1.) The slurry flows through reactor tanks (3, 4 and 5) in which there action goes to completion, forming phosphoric acid and gypsum crystals.

The cooling of the slurry is accomplished by a recycling operation involving flowing part of the slurry in tank (5) up to a vacuum evaporator (7). The slurry then drops by gravity back to reactor (3). The evaporation of water produces the desired cooling effect.

The slurry passes from reactor (5) into a final tank (14), in which further cooling is provided by circulation through another vacuum evaporator (18). Here the temperature is reduced to 40 or 45° C, preparatory to filtering. This is necessary in order to prevent crystallization on chilling surfaces of the filtering apparatus (23).

Urea Purification

US 2,701,262, issued Feb. 1, 1955 to Lucien H. Cook and assigned to Chemical Construction corp., describes a process for separating unreacted ammoniun carbonate from urea.

As shown in Fig. 2, the reaction mixture is delivered to a decomposer (1) in which the distillation is carried out. Vapors leave the top, and aqueous urea solution leaves the bottom. As the liquid reaction mixture drops down through the packing, it is contacted thoroughly with hot recycled urea solution, thereby vaporizing all the available ammonia and carbon dioxide and some of the water. The recycled urea solution is heated externally in a shell and tube heater (5).

Making a Fluid Phosphate Fertilizer Slurry Suitable for Pelletizing

In the slurry process of producing phosphate fertilizer for pelletizing, phosphoric acid or a mixture of phosphoric and sulfuric acids and ammonia is used as starting material. This process is not suitable for utilizing raw phosphate rock instead of phosphoric acid because of the high water content needed to maintain the slurry sufficiently fluid for handling as a pumpable slurry. The cost of drying would in such cases be excessive.

US 2,700,605, issued Jan. 25, 1955 to Floyd B. Hornibrook and assigned to Best Fertilizers co., provides a way of overcoming this obstacle to the use of phosphate rock. According to the inventor, it has been discovered that by the proper addition of inorganic salts to the digestion mixture prior to the addition of the raw phosphate rock, it is possible to digest phosphate rock by the slurry process, and to simultaneously add nitrogen and potash, and end up the digestion phase with a fluid slurry having water content as low as 25 per cent. This enables the pelletizing of the slurry by the slurry process while holding the drying cost within an economic range. The inorganic salt may be ammonium sulfate, ammonium nitrate, potassium sulfate, potassium nitrate or ammonium biphosphate.

Herbicidal Compositions

US 2,701,759 and 2,701,706, issued Feb. 8, 1955 to Albert W. Feldman and Allen E. Smith and assigned to United States Rubber co., discloses some new compositions for controlling the growth of weeds.

In the first patent the herbicide consists of an aqueous dispersion of a hydrocarbon oil which boils above 150° C and N-(1-naphthyl)-phthalamic acid. In the second patent, the calcium salt of the acid is used. Examples of the results are given in each of the patents. ◆

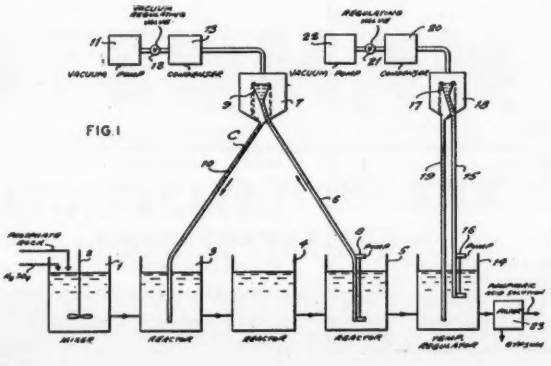

FIG. 1

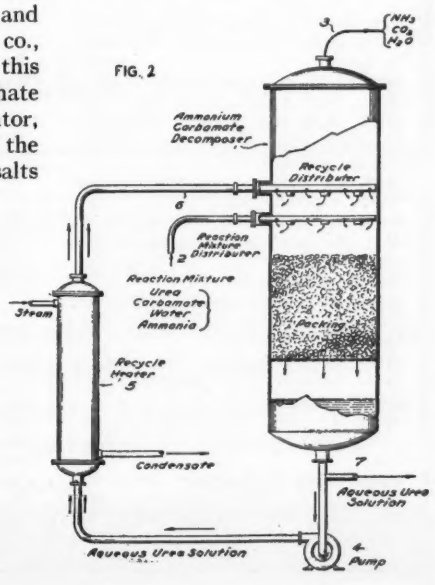

FIG. 2

Presented in cooperation with the Economic Insect Survey Station, Plant Pest Control Branch, Agricultural Research Service, USDA.

Boll Weevil Survival Counts

COUNTS of boll weevils surviving the winter have been complete in Louisiana, South Carolina, North Carolina and Virginia. These counts have been made from ground trash samples collected by cooperating state and Federal agricultural agencies in approximately the same locations from which samples were taken for fall hibernation counts.

Average survival counts in Madison parish, La., were 2,021 live weevils per acre. This is about 2½ times the average found in this parish during the past 19 years. On a percentage basis, this count is 75 per cent of the number found in the 1954 fall hibernation survey and in the 19 years during which records have been kept is exceeded only by 1953, 1949 and 1941. In other Louisiana parishes the survival percentages were as follows: Ouachita 11; St. Landry 29; Avoyelles 18; Red River 100 and Bossier 86. Previous years figures are not available for the latter parishes.

Ground trash from five farms in each of nine counties in North Carolina was checked for surviving boll weevils. The average number of live weevils found per acre was 236. This gave a percentage survival rate of 17.6 of the 1,334 weevils found in fall hibernation counts. Although no previous fall counts for North Carolina are available, Spring counts in 1954 were 1,820 surviving weevils per acre and 3,920 in 1953. Boll weevil survival counts were very low in southeastern Virginia with the average being 73 per acre. The average survival was 3.5 per cent of the 2,033 found in 1954 fall hibernation counts. The Florence county, S. C., survival figures as reported in this column last month were 2,178 live weevils per acre as compared with the average of 2,887 for the past 18 years, but the percentage survival was 94.7 exceeded only in 1949, 1950 and 1953.

Although no previous figures are available for Washington county, Miss., Spring counts of trash samples show 1,646 live weevils per acre. This compares favorably with the counts from Madison parish, La.

The first insect activity in cotton fields has been reported from the Lower Rio Grande valley of Texas where damaging numbers of thrips were found in fields adjacent to onions. Spider mites in damaging numbers were present in a few fields prior to the cold weather in late March.

Bollworms were found feeding in the terminal buds of seedling plants and cutworms were present in all areas, particularly where cotton followed leafy vegetables. Bollworms were also active in flax in Refugio county, Tex. Larvae were feeding on the green pods and at one location near Bayside the count was at the rate of 15,895 per acre.

Cereal and Forage Pests

By the latter part of March heavy infestations of greenbugs were developing on irrigated wheat in the Panhandle area of Texas. In Hale county counts reached 180-200 per linear foot of row while in Swisher county and the Hereford area of Deaf Smith county counts ranged from 500 to 2,000 per foot. Light local infestations on small grains were reported widely distributed in the north central Texas area north of Dallas and Fort Worth. A severe infestation of greenbugs on about 75 acres of barley in Tensas parish, La., was reported as being heavily parasitized by a parasitic wasp. This parasite was also reported from the north central Texas area.

Activity was also reported locally from Arkansas, Mississippi and Florida. Below economic numbers were reported from Marana, Ariz., Wyoming, Nebraska and Montana. Populations in central Arizona, from where it is believed the eastern Utah and western Colorado infestations originate, averaged 225

Calendar

May 3-4—Carolinas-Virginia Pesticide Formulators Association, Pinehurst, N. C.
May 15-17—Chemical Specialties Mfrs. Assn., Statler hotel, New York City.
May 16-20—6th National Materials Handling Exp., International Amphitheatre, Chicago, Ill.
May 19—Fert. section, 25th annual North Carolina Safety conf., Robert E. Lee hotel, Winston Salem, N. C.
May 20—Grazing System Award Dinner, sponsored by Ga. Plant Food Educ. Society, Atlanta, Ga.
June 2—South Carolina Fertilizer meeting, Sandhill Experiment Sta., near Columbia, S. C.
June 3—Fertilizer section, Virginia State Safety Assn., Jefferson hotel, Richmond, Va.
June 11—Exec. committee, Fert. section, National Safety Council, Roanoke, Va.
June 13-15—Preliminary convention, National Plant Food Institute, Greenbrier hotel, White Sulphur Springs, W. Va. (joint meeting, American Plant Food Council and National Fertilizer Assn.)
June 21—Western Agric'l. Chemicals Assn., Hotel Clark, Los Angeles, Calif.
June 22-24—Pacific Slope Branch, ESA, Mission Inn, Riverside, Calif.
June 27-29—Summer meeting, North Central Branch, American Society of Agronomy, Ames, Ia.
June 28-30—Sixth annual Pacific Northwest Plant Food Assn. Regional Fert. conf., Boise hotel, Boise, Idaho.
July 27-29—Summer meeting, NE Branch, American Society of Agronomy, University Park (formerly State College), Pa.
Aug. 10—Ky. Fert. conf., Guignol Theatre, University of Kentucky, Lexington.
Aug. 15-19—American Society of Agronomy and Soil Science Society of American meeting, University of Calif., Davis campus.
Sept. 7-9—National Agric'l. Chemicals Assn. annual meeting, Spring Lake, N.J.
Sept. 7-9—9th annual Beltwide Cotton Mechanization conf., Texas A & M College, College Station, Tex.

psyllids per 100 sweeps. Southern California counts averaged 13 per 100 sweeps and it is thought the northern Utah infestations originate in this area.

The infestations east of the Rockies are believed to originate in southwestern Texas and southern New Mexico. Counts this year were 22 per 100 sweeps on about half of the 1954 count. However, epidemic numbers occurred in eastern Colorado, eastern Wyoming and western Nebraska in 1949 following a spring population of 18 in the Texas-New Mexico area in 1950 following a population of 19 and in 1953 following a population of 29. Weather, of course, is a deciding factor; slightly above normal temperatures in May and above normal temperature in June in the northern states is favorable for psyllid movement.

European Corn Borer

The estimated loss to field corn in 1954 from the European corn borer has been announced. The figures are compiled from reports supplied by cooperating state agencies in the states concerned. The loss was estimated at about 261 million dollars or about 191 million bushels of corn. This compares with a loss of about 125 million dollars in 1953 and 77 million dollars in 1952. The heaviest loss in recent years was in 1949 when an estimated 313 million bushels of corn valued at 349 million dollars was lost to the borer.

Fruits Damaged by Freeze

The freeze of late March had a decided impact on the fruit potentials in the area from southern Illinois and Indiana to the states south and east. In this area a large percentage of the potential peach crop was destroyed: the apple crop also suffered severe damage in certain areas. In some sections reports state that it is doubtful if additional spraying on these crops will be made this year. Fruit insects, however, should still be watched and where feasible controlled.

Prior to the freeze, overwintering codling moth larvae were more plentiful at Vincennes, Ind., than since 1944, and up to that time also the weather had been favorable for survival of this pest in Virginia. Although reports on the effect of the low temperatures on the insect in these areas are not yet available, the larvae survived the freeze in the apple area of North Carolina. Eggs of apple aphid, the European red mite and pupae of the oriental fruit moth also withstood the cold in the latter state. Rosy apple aphid was present in large enough numbers in Lawrence and Orange counties, Ind., the second week of April to cause damage to the remaining apple crop in that area.

Potato Psyllid Survey

A survey conducted in late March to determine the potato psyllid populations on wild host plants in the Southwestern states showed above normal numbers present. It is from this area that this pest, which causes psyllid yellows, moves into the potato and tomato growing areas of Colorado, Utah, and surveys in Kansas show only a few specimens but still of noneconomic importance. By the latter part of March and early April the alfalfa weevil was becoming rather active in some of (to page 60)

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Aminotriazole as a Weed Killer

ACP Report Shows Promise of Amizol in Controlling Canada Thistle, Nutgrass, Quackgrass

DATA from American Chemical Paint co., Ambler, Pa., indicates that aminotriazole offers considerable promise as an herbicide for control of such tenacious weeds as quackgrass, Canada thistle and nut grass.

The material, tradenamed Amizol by ACP, is known chemically as 3-amino-1,2,4 triazole and has been patented by the company for manufacture and marketing as both an herbicide and a defoliant. It is available this year under an experimental label.

Agricultural possibilities of the chemical were determined by William Allen, an avid amateur color photographer and chief agricultural formulating chemist for ACP. It was previously used in small quantities in a special process for manufacturing photographic film.

Control of Canada Thistle

Amizol appears to be very effective for control of Canada thistle, which in the past has been retarded only with quantities of soil sterilants or repeated applications of 2,4-D.

Tests by O. C. Lee, Purdue University, involving rates of 2, 4 and 8 pounds per acre in 150 gallons of water applied on May 13, 1954, when plants ranged from three to 15 inches high, showed "severe chlorotic symptoms" from all treatments. Top growth was eventually destroyed with the exception of a few plants on plots receiving the minimum dosage.

On Oct. 8, the stand of thistle on treated plots was less than a fraction of one per cent of that on check areas, and analysis showed that portions of the roots had been destroyed to a depth of 12 or more inches. Although sections of live roots with live growth buds were found in all treated plots, they did not appear as healthy as those found in check areas.

ACP also points to tests conducted by A. L. Bakke and E. P. Sylwester in Iowa. Heavily infested plots were sprayed on June 28 when oats were beginning to ripen and thistles were in bud stage. Treatments involved one pound rates of Amizol, 2,4-D, ACP-LV4, ACP-L674, Weedone 638, ACP-1659 and an Atlacide-2,4-D mixture, Dow Brush Killer and Pitt Brush Killer. No regrowth occurred on any plots by July 30, despite hot weather and lack of rainfall. After heavy rainfall during August and September regrowth occurred on all plots but those treated with Amizol and the Atlacide-2,4-D mixture.

Timing is as important as application rate in killing the thistle, and it was found that treatments applied at bud stage gave a complete kill of top growth. Only very occasional delayed shoots were observed at the end of the season.

Quackgrass Control

The outlook is equally good for quackgrass control, and ACP turns to Penn State's Stephen Raleigh for confirmation. He reports that the material translocates readily and slows down rate of growth so that the pest is easily killed by cultivation.

Application at 12 pound rate killed about 99 per cent of quackgrass under all conditions and a six pound rate killed 98 per cent when disced under good conditions. A 12 pound maleic hydrazide application was about as effective as six pounds of aminotriazole; six pounds was somewhat poorer.

Canadian research director for ACP, Thomas K. Pavylchenko, also reports excellent results. In one experiment the chemical was active for 29 days, killing top growth and preventing regrowth for 29 days.

It is effective when applied on early spring growth, and within seven to 10 days a field can be plowed and tilled for corn. The material leaves the soil quickly and, so far, has shown no detrimental effect on corn.

On nutgrass, the ability of the new chemical to translocate to the tuber system, affecting growth from the tubers, shows considerable promise. This was demonstrated in preliminary greenhouse tests by E. W. Hauser, USDA, and J. T. Thompson, Georgia AES, Experiment, Ga.

In the field the two researchers applied three pounds as two applications on May 8 and May 26 and, ten days later, two areas treated with a total of six pounds were disked and two were untouched. A month later, 90 per cent of the plants on the disked area were chlorotic indicating translocation to the tuber system.

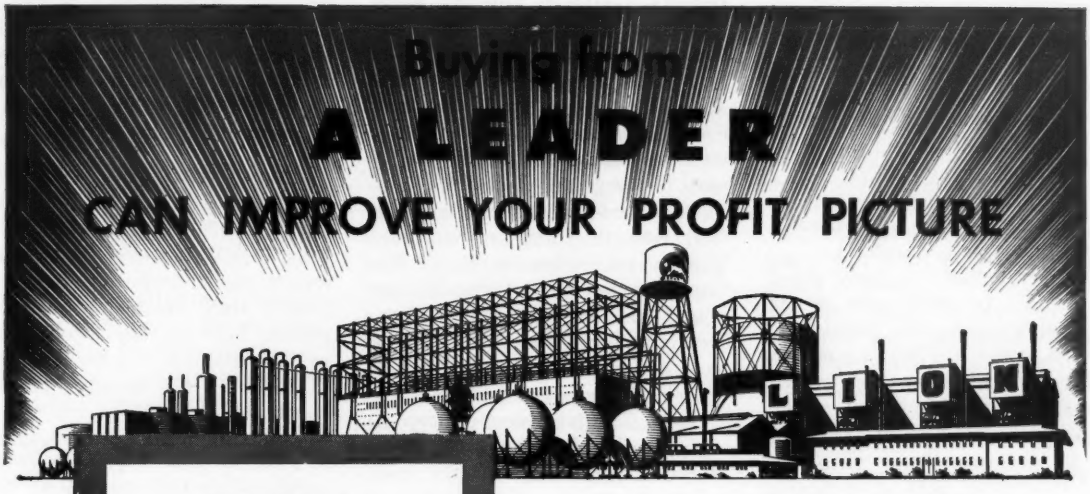
Early observations indicate that disking is beneficial following application, and preliminary work suggests use of cover crops following treatment for further control.

Again, more work is needed to determine effective timing of application, rate and desirable cultural practices.

Against woody plants, six pounds or more of aminotriazole per 100 gallons of water, applied to run off, affected poison ivy, white ash, black oak, scrub oak and hickory. Poison ivy was most susceptible, and rates down to one pound per acre in water gave complete control.

Other possibilities for use of the chemical include control of Johnson grass on ditch banks, Bermuda grass, hemp nettle, stick weed, bull mustard, giant foxtail, cattails, tulles, milkweed and wild buckwheat.

Amizol has been studied as a chemical agent for drying switch grass, grain sorghum and corn to facilitate mechanical harvesting by N. E. Shafer, University of Nebraska. Small amounts added to Magron, Chem-Frost and sodium monochloroacetate gave marked increase in activity to these compounds as drying agents. ◆



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3 **You Solve Problems Quicker** • If you run into a formulation snag, Lion's highly trained Technical Staff will be ready to give you the kind of technical assistance that can only come from a leader. This aid can help improve your profit picture... and *it's yours for the asking.*

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LION OIL COMPANY

CHEMICAL SALES DIVISION — EL DORADO, ARKANSAS

Pest Reports (Cont'd)

(from page 57) the Eastern states. The weevil was active throughout Delaware and in northern Virginia counties. Larvae were reported active in both Maryland and Pennsylvania. Adult weevils were active in western Nevada during late March, egg laying was under way and limited adult control was practiced in most of the valleys.

Hatching of the meadow spittlebug was under way in Delaware, Pennsylvania and Maryland.

The pea aphid by early April was rapidly becoming one of the more important legume pests in the Eastern states. The increase on alfalfa in Virginia was very rapid throughout the state as well as the Maryland Eastern Shore. The pest was on the increase in Delaware and Texas but light in Pennsylvania, North Carolina, Illinois, Missouri, Oklahoma, Utah and Arizona. Spring generation armyworm larvae have been taken in Texas, Louisiana, Arkansas, and Florida. Overwintering larvae were taken in Missouri, and moths collected as far north as St. Genevieve county, Mo., and in Kentucky. In the southwest the yellow clover aphid still remains of prime concern. Damage this spring has been reported from Oklahoma, Texas, Arizona, California and Nevada.

Insects Active in Tobacco Beds

Midges were among the outstanding tobacco plant bed pests in North Carolina during late March and early April. In local instances these insects sometimes were responsible for destruction of most of the young plants. Light to moderate infestations were reported from Forsyth, Johnston, Sampson, Yadkin and Onslow counties. The vegetable weevil was also an important pest in tobacco plant beds. Nearly all beds in southern Georgia were showing some damage in mid-March, while several beds at Florence, S. C., had severe damage in early April. Moderate infestations of plant beds were reported from Sampson county, N. C. ◆

Statistics

January Superphosphate

Production of superphosphate in January amounted to 203,826 short tons (100 per cent APA), according to the Bureau of the Census, a decrease of one per cent from December, 1954 output, but 11 per cent higher than the corresponding month of 1954.

Shipments of all grades totaled 131,544 for January, up 21 and 18 per cent respectively. Stocks on hand at the end of the month were six per cent more than those held on the first of January and 12 per cent higher than those on hand as of January 31, 1954.

Maryland Fert. Sales

Sales of fertilizer in Maryland during 1954 totaled 311,232.68 tons, 15,000 tons over the previous record high, according to L. E. Bopst, state chemist. In mixed grades, 5–10–10 supplanted 3–12–6 as the state's best seller and sales of 10–10–10 are reported to have nearly doubled.

Complete mixed goods comprised 276,330.64 tons of the total, with another 14,160.60 tons in the form of superphosphate-potash mixtures.

N. D. Fertilizer Tonnage

R. O. Baird, North Dakota state chemist, reports that fertilizer tonnage for 1954 in the state totaled 48,642.5, a marked increase over the 1955 figure. Mixtures amounted to 22,701.9 tons with 8–32–0 the top grade.

Production — January, 1955 Including Preliminary 1954 Totals

Compiled from Government Sources

Chemical	Unit	January 1955	January 1954	December 1954	Preliminary 1954 Totals
Ammonia, synth, anhydrous	s. tons	270,363	209,972	253,687	2,719,660
Ammonia liquor, coal & coke (NH_3 content)	pounds	2,797,620	3,526,273	3,824,950	37,080,075
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	169,552	134,726	163,213	1,622,726
Ammonium sulfate					
synthetic (technical)	s. tons	103,001	58,799	94,620	928,447
coke oven by-product	pounds	158,890,242	150,298,294	155,097,989	1,645,735,884
BHC (Hexachlorocyclohexane)	pounds	1,445,024	4,758,298	1,957,101	59,311,615
Gamma content	pounds	255,690	628,788	343,529	9,275,011
Copper sulfate (gross)	s. tons	4,620	5,108	4,632	65,308
DDT	pounds	9,359,355	7,769,963	6,036,611	91,053,741
2,4-D Acid	pounds	2,503,198	1,797,614	3,396,364	28,408,487
esters & salts	pounds	1,734,673	1,094,794	1,082,316	20,521,616
esters & salts (acid equiv.)	pounds	1,361,796	854,071	881,539	15,610,918
Phosphoric acid (50% H_3PO_4)	s. tons	[1]273,553	248,636	*264,317	2,957,876
Sulfur, Native (Frasch)	l. tons	446,512	468,559	477,909	5,515,543
Recovered	l. tons	33,200	28,000	32,200	357,400
Sulfuric acid, gross (100% H_2SO_4)	s. tons	1,311,644	1,182,419	1,299,530	14,000,519
Chamber process (100% H_2SO_4)	s. tons	226,775	223,163	235,961	2,511,713
Contact process (100% H_2SO_4)	s. tons	1,084,869	959,256	1,063,569	11,488,806
Superphosphate (100% APA)	s. tons	203,826	183,643	206,309	[2]2,173,648
Normal (100% APA)	s. tons	141,993	136,165	151,115	1,644,488
Enriched (100% APA)	s. tons	3,667	———	4,331	[2]
Concentrated (100% APA)	s. tons	57,471	46,993	49,665	520,835
Wet Base (100% APA)	s. tons	695	485	1,198	8,325
2,4,5-T Acid	pounds	420,524	192,093	———	2,724,827
Tetraethyl Pyrophosphate	pounds	———	———	———	365,392

* Revised. [1] Includes quantities for 1 plant previously not reporting. [2] Includes production of enriched superphosphate.

FERTILIZER MATERIALS MARKET

New York

April 12, 1955

Nitrate of Soda. Seasonal shipments are going forward of both domestic and imported nitrate of soda and the situation of supply and demand seems to be in balance.

Ammonium Nitrate. With one producer reporting shipments slightly behind schedule, this material was well sold up for this season and demand has been good.

Urea. With larger quantities of domestic material being produced, imported urea has been more or less shut out of the market. However, some recent sales were made on the basis of $115 per ton at Atlantic ports with demand rather slow.

Nitrogenous Tankage. This material was reported slightly easier in price with some sales reported at $4.75 per unit of ammonia ($5.77 per unit N), f.o.b. shipping points.

Castor Pomace. With production of castor pomace on a curtailed basis, little improvement in the supply situation is expected in the next few months. Last sales were made on the basis of $37.50 per ton, f.o.b. shipping points, but no offerings have been made by the producers recently with the result that buyers have not been able to secure the quantity they need for this season.

Organics. Organic fertilizer materials showed an easier tendency the past week, caused by lack of buying by both fertilizer and feed interests. Feed business is rather slow at the moment, and the fertilizer shipping season has been retarded because of the cold weather. Tankage and blood were selling at $5 to $5.50 per unit of ammonia ($6.08 to $6.68 per unit N), f.o.b. eastern shipping points. Soybean meal sold at $58 per ton in bulk, f.o.b. Decatur, Ill., and linseed meal at $57 per ton in bulk, f.o.b. Minneapolis, both for prompt shipment. Cottonseed meal was slow and quoted at $60 per ton, f.o.b. Memphis.

Fish Meal. Supplies on hand were not large but demand was rather poor. Some imported material sold at $135, f.o.b. Atlantic port for 60 per cent protein content. Domestic fish factories are preparing to operate, but no boats have been sent out as yet.

Bone Meal. Demand is diminishing slightly from the feed trade, although fertilizer buyers have been active in the market with last sales at $75 per ton, f.o.b. shipping points. Production is still limited.

Hoof Meal. This market has been quiet with last sales at $6.75 per unit of ammonia ($8.20 per unit N), f.o.b. Chicago. Demand has been mainly from industrial buyers with the fertilizer trade taking very little.

Superphosphate. Some plants are having a little trouble moving their present production but are of the opinion that shipments will move quickly over the next 30 days. Triple superphosphate is unchanged.

Potash. While some domestic producers claim shipments are being made on a satisfactory basis, other reports indicate buyers are slow in taking out their season's requirements. Supplies are adequate to fill any expected need for this season.

Philadelphia

April 12, 1955

The materials market remains quiet, with organics still on the decline. Bone meal and castor pomace continue scarce. Nitrogenous tankage is in better supply. Superphosphate is plentiful, and potash is moving out in satisfactory volume. Severe weather is said to have caused enormous damage in the South.

Sulfate of Ammonia. While production is reported sold through June, there is no shortage of material and prompt deliveries are readily obtainable. No price changes are indicated.

Nitrate of Ammonia. Supply and demand are reported presently about in balance, but some sources look for large inventory accumulation after the Spring season is over. There is definitely no scarcity at this time.

Nitrate of Soda. Prices remain unchanged and movement is described as normal for this time of the year.

Blood, Tankage, Bone. Blood and tankage continue in weak selling position, with quotations at $5 to $5.50 per unit ammonia ($6.08 to $6.68 per unit N), depending upon location. Bone meal continues in rather limited supply at $75 per ton. Nitrogenous tankage while still reported scarce, seems to be in fair supply and is being offered at $4.75 to $5.25 per unit ammonia ($5.77 to $6.38 per unit N).

Castor Pomace. None is being offered.

Fish Scrap. Supply is not too plentiful and demand is slow. Quoted more or less nominally at $140 per ton for scrap, and $145 to $150 for meal. Imports of meal during 1954 exceeded 1953 by over 10 per cent.

Phosphate Rock. Domestic movement has improved. Supply is reported ample, but without selling pressure. Prices remain unchanged. The export position looks better with the easing off of ocean freight rates.

Superphosphate. Supplies are ample with demand slow and somewhat scattered. No price changes.

Potash. Producers report quite satisfactory demand, with good movement on contracts. Prices remain the same.

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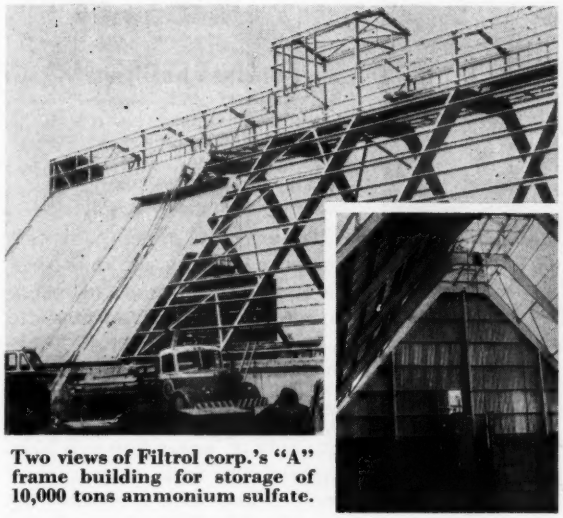

Two views of Filtrol corp.'s "A" frame building for storage of 10,000 tons ammonium sulfate.

Filtrol "A" Frame Storage Unit

A FEATURE of the new Filtrol corp. chemical plant at Vernon, Calif., is a rigid "A" frame type building designed for the basic requirement of handling and storing 10,000 tons of bulk ammonium sulfate.

The rigid "A" frame type structure was selected in order to minimize construction costs while at the same time providing coverage for cone shaped piles of material. The light structural frames are designed so that the roof angle slightly exceeds the angle of repose of the ammonium sulfate in an effort to minimize contact with the bulk chemical and the corrosion resulting from such contact.

All structural steel is protected with corrosion resisting paint and corrugated transite is used for roof and side wall coverage.

Foundations, sidewalls and floor are of reinforced concrete with the floor 17 feet below outside grade. The sidewalls are 22 feet high and are designed to take the thrust of the rigid framebents. The building, overall, is 170 feet long, 70 feet wide and 60 feet high.

The "A" shaped frames are made with a flat top to accommodate a gallery or monitor section 12 feet wide by 7'–6" high. This section runs the length of the building and houses a 60 foot shuttle conveyor used to distribute the bulk chemical with a maximum utilization of storage. Feed for the shuttle conveyor is received from another belt running from the manufacturing building.

Material is discharged from the building through drop holes to another conveyor located in a tunnel just below the main shed floor. This conveyor in turn discharges into an elevator at the end of the building which carries the material to bagging and shipping facilities. ◆

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editorial

The Khapra Beetle

ONE OF the principal subjects discussed at the recent North Central Branch, Entomological Society of America, meetings at Lansing, Mich., was control of stored products pests.

The Khapra beetle problem was reviewed by USDA's R. T. Cotton, who cited establishment of the Mesa, Ariz., research field station and the formation of a committee headed by A. E. Michelbacher of California to coordinate work of USDA, California and Arizona, as positive steps already taken to contain the pest.

Quarantine measures by Colorado, Arizona, California, Nevada, New Mexico and Utah have already been established and, early this year, a Federal quarantine became effective, said Cotton.

Whether or not the beetle can be confined to its present distribution in the US should be known within the next ten years, he stated, although it is known from experience in other countries that once established, it is difficult to eradicate.

Control of the Khapra beetle is difficult, for it has resistance to fumigants and contact insecticides similar to that of other stored grain pests. Difficulty of eradication from infested premises, said Cotton, is due to its habit of crawling into spaces in the building structure where it is difficult to reach. He cited cases of several warehouses thought to be entirely free of infestation after three or four thorough sprayings but in which were found "tremendous infestations" of the pest after grain was placed in storage.

WHAT is being done to gain more information on the beetle? In California, he reported, the Bureau of Entomology is experimenting with treatments for eradication from infested premises, and other state agencies are evaluating contact insecticides and fumigating materials. Effect of temperature, light and food on development of the pest is also under study there, while in Arizona work is being conducted on determination of food preferences.

Native to India, Ceylon and Malaya, it is considered the most serious of all storage pests in these countries. It has also been introduced and established in Europe, Africa, Asia and Australia. According to Cotton, there is no known case of it being eradicated from a country once the beetle is established.

In this hemisphere, occurrence is restricted to limited infested establishments in California, Arizona, New Mexico and Baja California.

Known to entomologists as trogoderma granarium Everts, the pest belongs to the same family as the carpet beetle. First indication of its presence, according to USDA, is the presence of fuzzy larvae or their cast skins in clusters around corners of grain bins or in used sacks. It is spread from one location to another in grain, feed, seed or in used sacks.

A California bulletin describes the larvae as yellowish or reddish brown with paler markings between segments providing a ringed appearance. Clothed with long brown hairs, a tuft of longer terminal hairs gives them a typical carpet beetle look.

Adults are brown to blackish with indistinct red brown markings on wing covers, hairy on top and may have a slick appearance when the hairs are rubbed off. Mature larvae are about 1/8 inch long, adult females run about 3/32 inches in length and adult males and immature larvae are somewhat smaller.

USDA has requested, through a recent folder, assistance in determining spread of the pest. If larvae are found, you are requested to capture the adult insects found near them and send both for identification to the Insect Identification and Parasite Introduction Section, ARS, USDA, Beltsville, Md.

Specimens should be placed in a glass or plastic vial filled with rubbing or 75 per cent grain alcohol. Pack the bottle with cotton and place in a box or mailing tube. Indicate that you suspect the specimens to be the Khapra beetle and be sure to include your return address.

The folder "Have You Seen This in Your Grain," describing the pest and methods of locating it is available without charge from the Stored Product Insects Section, AMS, USDA, Washington 25, D. C.

These five general methods of searching for the pest are suggested:

Hand-sift grain, especially that near edges of a grain pile, next to walls of grain bins, loaded freight cars and other storage areas;

Screen a handful of sweepings through window screen when a storage area is emptied;

Examine outer surfaces of bagged grain, seed or screenings paying particular attention to top seam and inside ears of the bag;

In grain bins, examine corners next to wall studs, footings and similar places; (larvae leave grain when ready to pupate and congregate in great numbers in such locations;

Examine cleanings from elevator boots, conveyors, vacuum cleaner systems and bag cleaners, screenings from seed or grain samples.

We hope that all those concerned in any way with the stored products problem will cooperate with USDA in determining infestations of this menacing pest.

G. P. T. JR.
Editor

Chemicals

170—Mineralized Fertilizers

With Tennessee corp. custom-formulated mineral mixtures you can offer a completely mineralized fertilizer with the addition of only one ingredient to your regular fertilizer. The Tennessee product is delivered in bulk or bag, carefully mixed in controlled amounts of soluble copper, manganese, iron, zinc, magnesium and boron ready for addition. For specifications and detailed information

CIRCLE 170 ON SERVICE CARD

171—Dieldrin for Homes

Shell Chemical's dieldrin does a fast clean-up job on cockroaches, ants, silverfish and other "uninvited guests" when applied in sprays and dusts. It is effective in small quantities and creates a barrier against re-infestation that lasts for months. Use modern formulations containing this pesticide and keep ahead of your competition. For technical literature

CIRCLE 171 ON SERVICE CARD

172—Pike's Peak Clay

Production is speeded and you save on ton prices with Pike's Peak clay from General Reduction. It has a high degree of absorbency, uniformly low moisture and a *p*H of about 5. Standard grind is guaranteed 95 per cent 325 mesh and a variety of other particle sizes is available to meet specifications. For complete technical data

CIRCLE 172 ON SERVICE CARD

173—Neville Phenothiazine

High quality and purity are features of phenothiazine from Neville Chemical. Both N. F. and drench grade are available for prompt shipment. For samples and prices distributors can

CIRCLE 173 ON SERVICE CARD

174—Attaclay Digest

The current issue of ATTACLAY PESTICIDE DIGEST from Minerals & Chem. Corp. of America discusses various aspects of pesticide processing. Formulators who would like to get this and future issues can

CIRCLE 174 ON SERVICE CARD

175—Antara Catalog

A new edition of its product catalog has been issued by Antara Chemicals. Included is data on established items and many new chemicals developed since the first catalog was published. A brief description, standard packing information and added remarks are presented on various Antara wetting agents, emulsifiers and detergents.

CIRCLE 175 ON SERVICE CARD

176—Heptachlor for Alfelfa Weevils

This is the subject of a new six page folder from Velsicol corp. Information is provided on stopping weevil infestations, protecting useful parasites and obtaining better crops, along with specific suggestions on methods and rates of heptachlor formulations.

CIRCLE 176 ON SERVICE CARD

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

177—Crag for Peanuts

Two new pamphlets from Carbide & Carbon Chemicals describe the use of Crag Herbicide-1 in peanut growing. The chemical is used to kill weed seeds as they sprout and use can result in savings of about $6 per acre in cultivation costs. Other data is provided on use of proper equipment and methods and dates of application.

CIRCLE 177 ON SERVICE CARD

178—Liquid Fertilizers

Victor Chemical Works is offering an eight page booklet on the preparation of liquid fertilizers. Included are flow diagrams and tables and a list of equipment necessary for a plant with five to 10 tons/hour capacity. Cost of such a unit is estimated at $17,000. For a copy of the booklet

CIRCLE 178 ON SERVICE CARD

How to use the READER SERVICE CARD

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- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

Process Equipt.

179—Munson Mixers

Munson rotary batch mixers provide fast, accurate blending of dry ingredients through a 7-way mixing action that assures extreme accuracy of blend without grinding or size reduction of individual particles. Available in capacities from 20 to 250 cu. ft., the units can be altered to fit your individual requirements and can be fitted with internal spray for introduction of limited amounts of liquid. For complete details

CIRCLE 179 ON SERVICE CARD

180—Ammonia Converter

Your nitrogen solution can be produced for less with a Carlile converter, according to the manufacturer. The unit offers high capacity, continuous conversion of anhydrous ammonia and automatic or manual operation. Plants built around the converter economically convert tank car NH_3 to aqueous ammonia. For a new bulletin

CIRCLE 180 ON SERVICE CARD

181—Dryers & Coolers

For the manufacturer of granulated fertilizers, Davenport rotary air coolers and rotary direct fire dryers are produced in sizes from 2'3" to 10' diameter by 14' to 60' long. The company also builds ammoniating and granulating equipment to specifications. A complete catalog is available.

CIRCLE 181 ON SERVICE CARD

182—Automation

Dorr-Oliver has a bulletin for companies considering a new plant or expansion of present facilities which provides the complete story on the factors that make D-O plants modern and efficient. Complete mechanization and simplified control bring ease of operation, high production, lower costs and quality control. For a copy

CIRCLE 182 ON SERVICE CARD

183—Young Dust Blender

Young Machinery now offers a portable, cut-back dust blending system with a capacity of 4 to 6 500 lb. batches per hour. It is delivered ready to operate with dust hoods, sifter, premixer, pneumatic conveyor-blender and all motors wired to a push button control panel. For information

CIRCLE 183 ON SERVICE CARD

184—Liquid Level Gauges

The complete Bristol line of liquid level gauges for indicating, recording, controlling and telemetering is described in a new 26 page bulletin. Shown are float-, pressure-, differential pressure- and bubbler-type units in strip and round-chart models. Engineering data on choice of proper bulb and instrument for a given installation are presented along with installation information on telemetering and remote control.

CIRCLE 184 ON SERVICE CARD

185—Oliver Pump

The Oliver type L centrifugal pump, is described in a new six page Dorr-Oliver bulletin. Data on the corrosion resistant chemical pump include mechanical features, types and sizes, materials of construction, applications and advantages of use. Major design improvement is the high cut-water or tongue of the volute—a feature which makes the unit self-venting, minimizes formation of air pockets and improves priming characteristics.

CIRCLE 185 ON SERVICE CARD

Materials Handling

186—Link-Belt Buckets

A new folder on Link-Belt High Speed elevator buckets will be of interest if you are designing a new bucket elevator or are considering an increase in capacity of a present installation. Information on recommended head and boot designs is contained with a quick check elevator capacity chart and recommended belt widths for single, double, triple and quadruple rows of buckets. Charts give recommended pulley diameters and belt speeds and specifications on the "HS" bucket line.

CIRCLE 186 ON SERVICE CARD

187—Auto-Scoop

Jaeger Machine's Auto-Scoop is designed to work in cramped quarters and is termed ideal for unloading boxcars and other jobs. It has important advantages over comparable 12 cu. ft. loaders, offering large loads, short turning radius, fast carry and high dump. For a catalog

CIRCLE 187 ON SERVICE CARD

188—New Weigh System

An unusual weighing and handling system is described in a two page technical reference from Richardson Scale co. The system utilizes a line of batch hoppers suspended from an elevated monorail and, under the remote control of one operator, the hoppers are automatically tare weighed, filled with multiple ingredients, net weighed and conveyed to a delivery point for discharge.

CIRCLE 188 ON SERVICE CARD

189—Pneumatic Conveying

Convair has released a new booklet describing its vacuum, vacuum pressure and pressure pneumatic conveying systems. It shows typical installations in many industries, some of which are adaptable to the farm chemicals field.

CIRCLE 189 ON SERVICE CARD

190—Rapistan Catalog

A comprehensive general catalog has been issued by Rapids-Standard, including data on the gravity and power equipment and miscellaneous products manufactured by Rapistan. Emphasized are the benefits of standardized, all-purpose conveying equipment and Rapistan service and representatives.

CIRCLE 190 ON SERVICE CARD

191—Yale Electric Truck

Yale & Towne has issued bulletins completely describing the new K-46 electric, stand-up, hydraulic lift truck. Separate brochures provide data on the two-, three- and four-thousand capacity models. All three are available in 68, 83 and 90 inch overall heights with telescopic lifts up to 100, 130 and 144 inches, respectively. Hydraulic tilting features provide for a five degree forward and 10 degree backward tilt.

CIRCLE 191 ON SERVICE CARD

192—Tight-Lip Buckets

A Blaw-Knox bulletin shows how "tight-lip" construction of its chemical and fertilizer buckets prevents contamination caused by leakage of granular fines. It also describes the wide range of models that are available, permitting selection of proper size, weight and type unit for your installation.

CIRCLE 192 ON SERVICE CARD

Packaging

193—New Kraft Packer

Kraft Bag corp. is now marketing the Kraftpacker, an automatic, open mouth bag filling machine that increases production and greatly reduces packaging costs. It maintains accuracy to within a few ounces even at speeds up to 24–100 lb. bags a minute with one operator. A brochure is available.

CIRCLE 193 ON SERVICE CARD

194—Bagpacker "A"

Large tonnage bagging is a one man operation with an International Paper co. Model A Bagpacker. Up to 350 tons can be bagged per eight hour shift without overtime. Accurate weighing, filling, settling and sewing are fully automatic—the operator only hangs empty bags on the filling spouts. The company says the unit can pay for itself in as little as one year. For full information

CIRCLE 194 ON SERVICE CARD

195—Merchandising with Boxes

Hinde & Dauch has released a new edition of "How to Merchandise with Corrugated Boxes." It features points to remember in plotting a merchandising campaign and discusses consideration of the product, purchasers, methods of distribution, activities of competing firms and criteria for decisions on box design and color. Although no farm chemicals packages are described, some of the principles will be of special interest to small package producers.

CIRCLE 195 ON SERVICE CARD

196—Gross Bagger

Richardson Scale's manually-operated gross bagger is illustrated and described in a new data sheet. The bagging scale is equipped with automatic cut-off device and fills and weighs textile or multiwall bags in capacities of 50 to 140 lbs. A dimensioned engineering drawing shows top and side views.

CIRCLE 196 ON SERVICE CARD

Miscellaneous

197—Depreciation Methods

The Jaeger Machine co. has prepared a booklet, "New Depreciation Methods of Contractors," which describes the new allowances under the 1954 tax law, with special attention to the purchase of new machines and installment buying. Examples are included to illustrate the tax methods, re-investment of capital investment plan and financing with a bank loan.

CIRCLE 197 ON SERVICE CARD

198—Gotcher Applicators

The 1955 catalog of Gotcher Eng. & Mfg. is available and describes the firm's pull-type, tractor-mounted and semi-mounted ammonia applicators. Gotcher units have an exclusive sealing wing which eliminates packer wheels and permits no loss of ammonia. For a catalog

CIRCLE 198 ON SERVICE CARD

199—Hose Check List

A hose check list for maintenance men has been issued by the Thermoid co. highlighting basic rules for longer life and better performance for industrial hose. It is printed on stiff cardboard for wall mounting and is lacquered for protection against moisture, oil, grease and dirt.

CIRCLE 199 ON SERVICE CARD

See the Industry News section, pages 22-23-24 for information on these Reader Service numbers—

200—Methyl Parathion
201—Perma Green
202—NH_3 Tank Trailer
203—Ful-Tone Printing
204—D-K Rotary Mixer
205—Agitator Nozzle
206—G-W Oscilveyor
207—Lagz Coating
208—Phenoline Coating

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

AMMONIA—Anhydrous and Liquor
Commercial Solvents Corporation, New York City
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
U. S. Industrial Chemicals, New York City

AMMONIA APPLICATORS
KBH Corp., Clarksdale, Miss.

AMMONIA CONVERTER
J. C. Carlile, Corp., Denver, Colo.

AMMONIUM NITRATE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.

AMMONIUM PHOSPHATE
Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE
See Sulfate of Ammonia

BAGS—BURLAP
Chase Bag Co., Chicago, Ill.

BAGS—COTTON
Chase Bag Co., Chicago, Ill.

BAGS—Multiwall-Paper
Chase Bag Co., Chicago, Ill.
International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Kraft Bag Corporation, New York City
Union Bag & Paper Corp., New York City

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES
International Paper Co., Bagpak Div., N. Y. C.

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES
Stedman Foundry and Machine Co., Aurora, Ind.
Union Bag & Paper Corp., New York City

BHC AND LINDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.,
Pennsylvannja Salt Mfg. Co., of Wash., Tacoma, Wash.

BONE PRODUCTS
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
American Potash & Chemical Corp., Los Angeles, California
Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BULK TRANSPORTS
Highway Equipment Co., Cedar Rapids, Ia.

CALCIUM ARSENATE
American Agricultural Chemical Co., N. Y. C

CARS AND CART
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

CHEMISTS AND ASSAYERS
Shuey & Co., Inc., Savannah, Ga.

CHLORDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.

CLAY
Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

CONVEYORS
Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

COPPER SULFATE
Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa

CUSTOM PESTICIDE FORMULATION
Barco Chemicals, Inc., Des Moines, Ia.

DDT
Ashcraft-Wilkinson Co., Atlanta, Ga.

DIELDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

DILUENTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.
Summit Mining Corp., Carlisle, Pa.
Thomas Alabama Kaolin Co., Baltimore, Md.

DITHIOCARBAMATES
Berkshire Chemicals, New York City

DUST APPLICATORS
Raw Materials Trading Co., New York City

ELEVATORS
Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

ENDRIN
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Marietta Concrete Corporation, Marietta, Ohio
Stedman Foundry and Machine Co., Aurora, Ind
Sturtevant Mill Co., Boston, Mass.

FERTILIZER—Liquid
Clover Chemical Co., Pittsburgh, Pa.

FERTILIZER—Mixed
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS
Bradley & Baker, N. Y. C.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH
Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES
American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Metalsalts Corp., Hawthorne, N. J.
Tennessee Corp., Atlanta, Ga.

HERBICIDES
American Potash & Chemical Corp., Los Angeles, California
Barco Chemicals, Inc., Des Moines, Ia.
Lion Oil Company, El Dorado, Ark.

HERBICIDES—Oils
Lion Oil Company, El Dorado, Ark

HOPPERS & SPOUTS
Stedman Foundry and Machine Co., Aurora, Ind,
Sturtevant Mill Co., Boston, Mass.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES
American Agricultural Chemical Co., N. Y. C
American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., Atlanta, Ga.
Barco Chemicals, Inc., Des Moines, Ia.
Berkshire Chemicals, New York City
Fairfield Chem. Div., Food Mach. & Chem. Corp., New York City
Pennsylvanna Salt Mfg. Co., of Wash, Tacoma, Wash.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

IRON SULFATE
Tennessee Corp., Atlanta. Ga

KAOLIN
Thomas Alabama Kaolin Co., Baltimore, Md.

LEAD ARSENATE
American Agricultural Chemical Co., N. Y. C.

LIMESTONE
American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Findlay, Ohio

MACHINERY—Acid Making and Handling
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Acidulating
Chemical Construction Corp., New York City
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.
Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

Buyers' Guide

MACHINERY—Material Handling
Clark Equipt. Co., Construction Mach. Div., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Jaeger Machine Co., Columbus, O.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles, Calif.
Power-Curve Conveyor Co., Denver, Colo.
Sauerman Bros. Inc., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Mixing and Blending
Munson Mill Mach. Co., Utica, N. Y.
Pousen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Mixing, Screening and Bagging
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Power Transmission
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, Washington, D. C.

MINOR ELEMENTS
Tennessee Corporation, Atlanta, Ga.

MIXERS
Munson Mill Mach. Co., Utica, N. Y.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF POTASH
Berkshire Chemicals, New York City

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
McIver & Son, Alex. M., Charleston, S. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Commercial Solvents Corporation, New York City
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.

NITROGEN MATERIALS—Organic
American Agricultual Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

ORGANIC MERCURY COMPOUNDS
Metalsalts Corp., Hawthorne, N. J.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

POTASH—Muriate
American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, Washington, D. C.
Southwest Potash Corporation, New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., Los Angeles, California
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCRAPER MACHINES
Sauerman Bros., Inc., Chicago, Ill.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Ludlow-Saylor Wire Cloth Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.
Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

SEPARATORS, AIR
Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

SHOVEL LOADERS
Clark Equipt. Co., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Jaeger Machine Co., Columbus, O.

SOLVENTS
Crowley Tar Products Co., New York City
Richfield Oil Corp., Los Angeles, Calif.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

SPREADERS, TRUCK
Highway Equipment Co., Cedar Rapids, Ia.

STORAGE BUILDINGS
Butler Manufacturing Co., Kansas City, Mo.
Marietta Concrete Corporation, Marietta, Ohio

STORAGE TANKS
Broadway Rubber Corp., Louisville, Ky.
Butler Manufacturing Co., Kansas City, Mo.
Cole, R. D., Manufacturing Co., Newnan, Ga.

SULFATE OF AMMONIA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH3 and Liquid N
Broadway Rubber Corp., Louisville, Ky.
Butler Manufacturing Co., Kansas City, Mo.
Cole, R. D. Manufacturing Co., Newnan, Ga.
KBH Corporation, Clarksdale, Miss.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr., Chem. Div., Pittsburgh, Pa.

TRUCKS—SPREADER
Highway Equipment Co., Cedar Rapids, Ia.

UREA & UREA PRODUCTS
Bradley & Baker, N. Y. C.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C

VALVES
Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.

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Southern Sales Office . . . Candler Building, Atlanta, Ga.

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- SULPHUR & POTASH
- ORGANIC AMMONIATES
- INSECTICIDAL AND INDUSTRIAL CHEMICALS

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